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ILLUSTRATIONS.

Portions of the Pavement, Siena Cathedral: From a Photograph ..... *Double-Page Typo-Gravure.*
Details of Pavement, Siena Cathedral.—From Drawings by Mr. T. MacLaren ..... *Two Double-Page Ink-Photo's.*
The Paris Exhibition: Sketches of Some of the Buildings Illustrating the History of Human Dwellings ..... *Double-Page Photo-Litho.*

Blocks in Text.

Plan of Part of the Town of Haddington ..... Page 445
Haddington Church: General View from the North-west, and View of West Doorway 446
Cylindrical Pillar, Llantwit Major 447
Part of Pavement, Siena Cathedral 448
Portion of Old Tower on Ludgate Hill, now being Demolished 449
A Group of Country Houses near Boston, Massachusetts, U.S.A. 450-451
Diagrams illustrating House Drainage ("The Student's Column") 453

CONTENTS.

The Municipal Pavilions at the Paris Exhibition 439
House Property 441
Notes 442
Architecture at the Royal Academy.—VII. 444
The Church and other Ecclesiastical Foundations at Haddington 445
The Cylindrical Pillar at Llantwit Major 447
Marble Pavement, Siena Cathedral 448
"Histoire de l'Habitation": Paris Exhibition 448
The Prince's Club, Knightsbridge 448
Old Tower on Ludgate-hill 449
Sanitation at Chelmsford 449
A Group of Country Houses near Boston, Massachusetts, U.S.A. 451
The Liverpool Architectural Society 452
"Geometrical Proportions" 452
Royal Academy Students' Club 452
The Student's Column. Town Drainage.—XXIV. 453
Books: Professor Ball's "Experimental Mechanics" (Macmillan); Nichols's "Mirabilia Urbis Romæ" (Ellis & Elvey); Jackson's "Aid to Survey Practice" (Crosby Lockwood); Wilson's "Practical Arithmetic and Graphic Statics" (Rivingtons); Campbell's "Notes and Tables Relative to the Strength of Materials"; "A New Shilling Book of Alphabets" (Field & Tuer) 453
Recent Patents 455
Recent Sales 455
Meetings 455
Miscellanea 456
British Archæological Association 456
Prices Current of Materials 457

The Municipal Pavilions at the Paris Exhibition.

AS we have mentioned in a previous article, there are at the Paris Exhibition two special pavilions, standing in front of the main dome at each side of the central axis of the Champ de Mars, which are devoted to illustration of the work of the municipal administration of Paris. To architectural visitors there will be no section of the exhibition more interesting than this, as it brings together illustrations of the whole *matériel* and method of conducting and maintaining public works in Paris, as well as a good many examples of what may called official art and architecture.

Commencing with the eastward of the two pavilions, the right-hand one as we look up the Champs de Mars in the direction of the Trocadéro, it may be said that in the sultry weather of Saturday last the most popular exhibit in the whole pavilion was the pretty bronze fountain near the entrance, the upper portion of which forms a small alcove or cupola with open arches at the sides and supported by figures on the piers, from the centre of the roof of which descends a thin stream of deliciously cool and clear water, the musical ring of which in the thin metal cups supplied for drinkers was heard without cessation the whole afternoon. Immediately in front of this, the next thing on the centre line of the gallery is the exhibit which gives the special point and meaning to the one just named. This consists of a triple glass tank containing the waters of the Ourcq, the Vanne, and the Seine in their unsophisticated state; the Ourcq and Seine waters showing a turbid brown, the Vanne a turbid white. The Municipality could not have put forward a better argument in support of their water supply. If they are able, out of the natural sources here indicated, to supply such a cup of cold water as is placed at the entry of their gallery, they may defy criticism as to the treatment and quality of their water supply, even if there may be, as has been said, some deficiency in regard to its quantity at some seasons of the year.

Water-supply and dealing with rivers occupy considerable space on this part of the floor. There are two or three large models of mills (*usines*) for raising water to the levels required for circulation; and there is a plan and model of the first reservoir in connexion with the Vanne water, where the water is led off from the stream into a large circular reservoir forming a green-covered knoll externally, whence the aqueducts branch for the conveyance of the water. There is also a large and interesting model, partly shown in section, of the Montmartre reservoir. This, in the highest portion, is in four stories, of which the two middle ones, consisting of a series of vaults on massive square columns, appear to be for the water storage; the outer containing walls are very thick, and battered, and the arches contiguous to the boundary walls act practically as internal buttresses. Above these vaulted halls is an upper story of vaults of lighter construction, supporting the finished ground surface, which is grassed over as a lawn and surrounded by a balustrade: this story also acts as a screen from the heat for the water reservoir below. At the bottom of the whole construction is a series of smaller arched passages, in which are placed the conduit-pipes for the water. Sections of the iron-pipes used for the water service are placed upright in a row not far from here, in sizes ranging from over a mètre to a few inches in diameter. Models of two or three recent bridges are shown,—the Pont de la Grande Jatte and the Pont de Suresnes, both on the system of elliptical arched iron cantilever girders and masonry piers with rounded bastion-shaped buttresses; there is also a working model of a small lifting bridge carrying the Rue de Grimée over the Bassin de la Villette, a bridge operated by hydraulic presses under control of an operator within the bridge-house, hauling on chains passing over large pulley-wheels supported on cast-iron columns at each side of the bridge end, and pulling with a straight vertical lift. The model, at all events, acts speedily and effectually.

Returning to the entrance of the pavilion, we find at the left hand the large erection representing a "maison insalubre," having ascended the three stories of which we cross by a gallery over the entrance to the upper story of the "maison salubre," and descend through that to the exit. This is, of course, the same kind of thing that was seen in London at the "Healtheries;" the models here are perhaps finished more carefully and in more detail, and both on the sanitary and insanitary side there are details which are of interest to an English visitor as presenting local peculiarities both of sanitation and of insanitation In the "maison insalubre" stress is laid on the unwholesomeness of standing pails for "slops" under sinks and lavatories, which in the sanitary house are shown drained by permanent waste-pipes, with S-bends under them,—the S-bend is universal in French sanitation, and particular attention is drawn to its necessity. The evil of angular jointing is also emphasised, and in the sanitary house longitudinal sections of pipe junctions are shown to illustrate the true way of turning the channel of a branch pipe into the main. In the small internal yard of the "Insalubre" is an antediluvian ventilator,—a large square wooden tube going up the side of the house, and ending just under the eaves. But the pride of the French "maison insalubre" lies in its cesspool under part of the internal yard surface, an apartment shaped somewhat like a bottle, arched over at the top, and with a neck left in the centre of the vault, the top of which is covered by a flagstone by no means air-tight. In the model the covering stone is off, and a dilapidated looking metal pipe emerges from the cavern, connected to a pump-looking engine standing by the side of the opening. The sectional drawings of the methods employed at various dates for "vidanges" or emptyings, which are to be seen on the screen opposite the entrance door of the "maison insalubre," throw a lurid light on the meaning of this piece of mechanism, which was a pump for pumping the contents of the cesspool in a pipe, and through another pipe discharging them into a barrel, either on wheels or not, for removal—where, we are not told. The study of these drawings causes a shudder in the sanitarian frame. They are labelled "Vidanges des fosses fixes." Under date 1668 we see the most primitive method of "enlèvement des solides à la hotte," a man down in the "fosse" digging up the deposit into a small tub, to be hauled up in successive loads, and the "enlèvement des liquides à la sceau," a similar system of sending down a bucket at the end of a cord; and this almost within the precincts of the habitation. In 1786 was introduced the "systéme Giraud," by which the soil was sent into a large wooden vat standing in the fosse, on bearers, and connected below by a pipe to a smaller "portatif" vat for removal; this was evidently supposed to keep the nuisance of removal more in hand. In 1788 an ingenious M. Gourlier invented a "systéme diviseur,"

by which a dwarf wall was built across the bottom of the fosse, making a partition, in which the solids gradually filled up the space and the liquids overflowed the edge of the wall into the other compartment. On the whole, a contemplation of this historic series of "vidange" operations makes one wonder that any Parisians were left to tell the tale; but former generations must unquestionably have been less susceptible than we are now, or how could they have either lived or endured life?

In the large coloured sections hung on the wall in further illustration of sanitation, the "Syphon D" is duly gibbetted, and the "insalubre" section gives a graphic pourtraval of the old condition of water-supply, and the sewage permeating from the cesspool into the well. In the similar-coloured section of the "maison salubre" there are more plugged-up inspection-pipes on the drains under the house than we should consider desirable, and the intercepting chamber is very small to English eyes; little more than a man-hole. Returning to the building showing the "maison salubre," we may notice that there are three different forms of water-closet shown, that on the top floor being a cased-up water-closet with a lead safe under, according to a system now pretty nearly exploded in England. The next floor shows a closet with a pedestal basin standing free, and on the second floor is an example of the French approved form of closet for the dependants or lower orders of the house. This is a closet with a very low seat (why so low we do not understand,—it is only about 10 in. high) built up of glazed stoneware, and round it is a sloping skirting of solid cement, about 2 ft. high, sloping back all round from the seat to the wall plane. The whole object of this is of course to make something of which every part should be thoroughly washable, and it may no doubt be a very good practice for places where a low order of persons are to use it, who will make no effort after cleanliness or propriety,—for jails or workhouses, for instance; but if the introduction of a "closet commun" of this class is considered desirable as a servants' closet in a French dwelling-house (as the model here would imply), the fact would form a rather severe reflection on the manners and habits of French servants; and we should rather conclude that it is introduced here from the wish to show as many forms of closet as could be got in. A great point is made in the "maison salubre" of hard material generally, as against the lath-and-plaster material which is found in some portions of the "maison insalubre"; as also of the conduction of all products of gas-burners to the outside of the structure, which is provided for by ventilating gas-brackets of a very tawdry ornamental description. The inlet ventilators, with mica valves, would be considered very insufficient in area with us, and moreover the mica flap valve is an institution which is rather theoretic than practical in its action. There is no systematic provision for admitting warmed air; there is a fireplace with an inlet of air shown at the side, a little way above the line of grate, but this is described as mainly for the purpose of affording ample supply of air for combustion. For this purpose it ought to be lower down; but to bring in a special supply of air for combustion direct to the fire from outside the wall is of course to prevent the fire performing the function which it otherwise is so useful in, that of creating a current of aspiration and keeping the air of the room in a state of flow. Again, in the coloured drawings of the "maison salubre" the soil-pipe ventilator is shown not standing straight up above the roof, but carried up the slope of the roof and then turned upright against a chimney stack and discharging nearly on a level with the chimneys. Here, then, is the double disadvantage of having two bends in the pipe, one at the eaves and another at the chimney, and of having the pipe discharging close to the top of the chimneys. There are such things as down-draughts in chimneys. From this and one or two other points we conclude that while the sanitary and insanitary houses are admirably and clearly got up, the true principles of house sanitation have not, in some points, been as thoroughly grasped in France as in England.

Outside of the sanitary house is an exposed section of a Paris sewer (of the 12 bis. type), showing the arrangement of a large oval-section sewer with a small invert formed in cement, and a continuous passage-way alongside of it wide enough for a man to walk with ease; above his head are the gas and water-pipes on bearers. The house-drain connections are made on the passage side, by small inverts left or excavated in the passage-way, and covered with a flush grating. This admirable arrangement of the Paris subterranean service, costly at the commencement, no doubt, but saving an immense amount of cost and inconvenience in taking up the streets subsequently, has been often described and commented on, but those who have not before seen it should not pass over this sectional full-size model. A large number of small-size concrete models of sewers and sewer-cleansing apparatus were also just getting completed in this portion of the room, including a very complete model of the apparatus used for cleansing the inverts of the large sewers from deposit of solid matter. This, as some of our readers are aware, consists of a flat-bottomed boat floating on the sewage current and pushing before it a large template on strong bearers with the lower edge cut to the section of the invert; this is supposed to push the deposit before it till it accumulates so far as to be raked out with hooked rakes made for the purpose. The boat is kept straight by a kind of mechanical steering apparatus, consisting of steel rods extending right and left horizontally from what would in an ordinary boat be the rudder head, and carrying at the extremities brass wheels or castors working horizontally against the sides of the invert, just below the foot walk. All this seems very ingenious and complete in a model, but whether such a scheme of cleansing is efficient in proportion to the cost and elaboration of the means employed we should think very doubtful.

In connexion with the water service, we noticed also a contrivance for forming a temporary dry-dock (bache mobile) for repairing the banks of the open aqueducts or canals, consisting of an iron caisson laid down parallel with the bank at a few feet distance, and the space filled up at the ends with double sheet piling filled in with concrete, sufficient waterway being left outside the caisson in the centre of the aqueduct.

In a side chapel, as it may be called, further on, are collected maps and views of Paris at different dates (not very numerous, one must admit), examples of old MS. documents of various dates, old official seals, and a good many photographs of arrow-heads and other objects, illustrative of the Seine "aux ages préhistoriques."

This part of the collection, however, can be hardly said to amount to more than an indication that the past history of the site of Paris has not been entirely overlooked; and we soon come again to modern practical work in the next bay, where the most conspicuous object is an admirably-arranged collection of the stones used in Paris roads and foot-walks, "matériaux de pavage," illuminated by small cubes of each material (many scores of them), with the name, place, and "coéfficient d'usure" labelled on each. Near this case of specimens are models of two machines for testing resistance to abrasure, whereby these "coefficients d'usure" are obtained. The one consists of a double cylinder placed on an axis inclined at an angle to the horizontal; in one of these are placed pieces of a hard porphyry, which is taken as normal, in the other an equal weight of stones of about equal average size of the material to be tested—after a certain number of rapid revolutions of the cylinders, the detritus in each cylinder is weighed and compared with the original weight of the material put in, and the coefficient of "usure" arrived at from these data.* Another apparatus for testing resistance to wear is shown, in which two cubes, one "normal" and the other of the material to be tested, are placed in holders with a calculated pressure put on to them by weighted levers which press on the upper side of the specimen, while the lower side is exposed to wear by the action of the periphery of a horizontal metal disc on opposite sides of which the two specimens are pressed by the levers above. This seems by far the most scientific and manageable of the two forms of test exhibited.

The lower end of this pavilion is occupied by an exceedingly interesting collection of examples of the artistic and architectural work of the municipality. First we have a collection of cartoons of paintings prepared for the decorative treatment of the walls and ceilings of various Mairies. These are not all in the highest style of art, certainly, and some of them are not sufficiently decorative in character; but considering how little attempt even is made at this kind of artistic embellishment of local municipal buildings in England, it would ill become us to be too critical. The large painting by M. Glaize, evidently a wall-painting for a Salle des Mariages, is really a fine thing: it represents a young man seated before the Temple of Hymen, the bride conducted to him by the Graces and a fluttering crowd of amorini; below are three fine seated figures of the Fates, in dark drapery, two of them engaged in spinning out the web of life; but Atropos, the third, has fallen asleep and dropped her shears, as on an occasion when the end of life is the very last thing to be thought of: a pretty bit of allegory. Two large paintings of Summer and Autumn, by M. Séon, are evidently intended as two halves of a ceiling, and are suitable for that position, in their light, "Chavannist" tone of colouring, though the architectural pilaster borders are too heavy and out of place on a ceiling; unless indeed these are intended for two semi-domes and not for a *plafond*; in that case the treatment would do well enough. M. Paul Baudouin's two paintings, apparently also intended for a Salle des Mariages, are too realistic in style, and rather absurdly practical in conception; they seem to represent Courtship and Matrimony; in the former a young man seated lazily on a horse standing in the middle of a stream keeps up a conversation with a girl on the bank; in the other one we are at a great washing-day "function," and the husband is wheeling away a barrow full of the clothes. There is something far more laughable than moral in this prosaic interpretation of the duties of a helpmate. M. Commére's four paintings of the four seasons are in a much more poetic vein than this, but too pictorial in style for wall decorations.

At the lower end of the pavilion we come on the illustrations of the architectural work of the Municipality, and this is a most interesting collection to the English architectural visitor, who, whether or not he admires the style of the buildings, must certainly be struck with the manner in which architectural work is illustrated; the large scale and fine style of the drawings, and the prevalence of large and elaborate models, a form of architectural illustration hardly used in England. The first exhibit seen is the only just completed model (to which the finishing touches were being put at the time these notes were made) of the building for the Musée Galliera, designed by M. Ginain. This is a square Classic building of one story, with an order of Corinthian columns with the flutings intercepted by what may be described as an annular rustication; the spandrels of the arches between the orders are very gracefully and effectively decorated with carvings of palm-leaves and garlands in low relief. Within the room devoted to architecture we find very large plans, and a still larger model of the great assemblage of buildings, consisting of two blocks on either side of the Rue de l'École de Médecine, designed by the same architect for the Faculté de Médecine. Great part of this is very plain in its architectural ordonnance; but the Cour d'Honneur,

* Two of the trays of specimens have been wrongly labelled, those marked as "after testing" should be before, and *vice versâ*.

with its screen of two double colonnades towards the street, and the order carried round the court-yard, is very dignified in effect; and the front towards the Boulevard St. Germain, with its Ionic order in the upper story, with colonnettes on screens between, and the broad solid treatment of the ground-story, is an admirable bit of adaptation of Classic elements.* On the other side of the room is a set of very large geometrical drawings, and a great plaster model, of the new Sorbonne buildings, designed by M. Nénot; also Classic, somewhat richer than, but not nearly so refined in detail as the building for the Faculté de Médecine. Among other buildings illustrated by drawings or models or both are the new buildings for the Garde Républicaine (illustrated in the *Builder* for July 7, 1888); the enlargement of the École de Droit, a building showing very original adaptation of classical features; M. Hénard's "Caserne de Port Royal," with an effective central tower of what may be called "classic castellated" type; the drawings for the new Mairies of the Thirteenth, Fourteenth, and Eighteenth Arrondissements; M. Moreau's elaborate series of drawings for a public abattoir; the model and bird's-eye perspective view of M. Roussi's "Caserne de Sapeurs-Pompiers" (which rather reminds us of one or two of the larger London fire-brigade stations); and the elevations of "École de Garçons" in Avenue Duquesne, showing a certain amount of effect obtained, in a very plain building, by the grouping of the windows and the introduction at intervals of panels of brickwork and coloured terra-cotta amid the plain spaces of white stonework. Altogether the architectural exhibits in this pavilion show a great amount of important work put in hand, and speak highly for the competency of the architects employed by the Municipality in carrying out their projects in public building.

The contents of the west pavilion of the Municipal Exhibition are illustrative of subjects less directly connected with building work, but many of them are of much interest in themselves, and some illustrate rather emphatically the French tendency towards elaborate statistics. There is a whole series of statistical maps of Paris, variously coloured to show the proportions of population of special ages in the various Arrondissements; another set showing the proportionate prevalence of various diseases; while a third set shows the proportion of persons, married, single, widowed, and divorced, in the various quarters of Paris; and a fourth set the proportionate numbers of various nations inhabiting the different quarters of the city. Any one giving some time to the study of these statistical maps, along with a detailed plan of Paris, would probably derive a good deal of interesting suggestion from them as to the reasons for the various local prevalences. It is observable that the highest average of married people is round the outer portion of the city; probably because house-room is cheaper there. The region where there is the highest proportion of young children from one to four years of age is to the south-west of the Île de France, between the Quai des Augustins and the Boulevard St. Germain; why there should be more young children there than elsewhere we know not. In the maps showing the proportion of different nations represented, the specially English quarter appears as that stretching north-west from the bend of the Seine just above the Champ de Mars. There are other maps showing the density of population per hectare in various parts of Paris, which would have considerable practical interest, no doubt, in connexion with the maps of prevalent diseases, but we had not time for this, nor would the crowded state of the Exhibition have admitted of any minute study of the numerous maps. We observed also a series of statistical maps of France giving the distributions of stature, length of foot, colour of the eyes, and brain development for different districts of France; these, however, appear to be taken from prison and workhouse measurements, and are therefore perhaps hardly reliable as representing general conditions. This department of the Municipal Exhibition shows that the city government of Paris is collecting an immense number of facts which may be of great value to students of anthropology.

The first portion of the west pavilion is occupied by a fine show of fire-engines and fire prevention and rescue *matériel*. Here we find also a map, in relief, of Paris, showing the water pressures at various zones of height, with all the reservoirs and watercourses laid down. In the next compartment are found the ambulance and hospital exhibits.

Below this a considerable space is devoted to educational exhibits. We have details of the work of the Primary Schools, which includes the rudiments of various technical trades—turning and other mechanical work, of which the results are exhibited. The "École Diderot d'Apprentissage," a technical school of a more advanced type, makes a very good show of metal-work and pattern-work, all executed by pupils of the school. Below this is a large space devoted to the illustration of instruction in drawing as carried on under the Municipality. An immense number of students' drawings are hung, a brief survey of which leads to the conclusion that they are not in advance of similar work done in the English Departmental schools of design; in figure drawing and drawing from the round, and modelling, there seems nothing to choose between the English and French students' work; and in coloured decorative design the English work may be said to be superior. The school fixtures for drawing schools are exhibited; the upright frame before each seat, with clips for supporting the copy, and the shelf and trays for pencils, &c., are all very well arranged, but the desk on which the pupil draws is absolutely level; a mistake, to our thinking: too much slope is inconvenient, no doubt, but some is required for comfort in drawing. The scholastic exhibition concludes with a display of gymnastic plant for schools, a subject to which the French are turning much more attention than formerly, and in regard to which they have recently paid us the compliment (not undeserved) of sending officially to England for special information and experience.

Altogether, these two pavilions in illustration of the organised work of the Municipal Government of Paris are of great interest, and give a high idea of the energy and the methodical organisation which is brought to bear on public works of construction, sanitation, and education. In some things no doubt they are behind us, and it is noteworthy that in the Exhibition, and in the large hotels &c. in Paris, the names of English sanitary engineers meet the eye continually, as affording the best guarantee to the visitor that this portion of the construction is satisfactory. In other points we may certainly take hints from them, and at all events everyone interested in building and sanitary regulations, and the other work incident to the well-being of a populous city, will find it well worth while to spend some time in the "Ville de Paris" Pavilions of the Exhibition.

* We gave an illustration of this front in the *Builder* for July 28, 1888.

HOUSE PROPERTY.

DAY by day new companies are presented to the public, and day by day promoters obtain even more money than they need from investors. Some of these undertakings are sound, some are the reverse: but the main point worthy of notice is that there never was a time when money was more abundant and investments more sought for. The inquiry, therefore, naturally arises what effect has this state of things on house property, and how is the latter likely to be affected in the immediate future? House property, generally speaking, may be regarded as consisting of two kinds, namely, country and urban houses. The first class is to a large extent affected by the value of agricultural land, since in many instances country houses are closely associated with farms and large landed properties. As regards this class of houses it seems unlikely that it will go lower in value. Agriculture may not improve, but agricultural land can now be bought to pay a small and sure rate of interest, and with the present low rate of interest returned by Consols, investors will be satisfied with lower interest for landed investments. Of course it takes some time for any kind of investment to recover from the shock which landed property has during the last few years received. But after a time confidence returns, new men become interested in the various properties, and it is certain that the general public will gradually perceive that there are worse investments than land, at any rate for surplus incomes.

There is also the fact to be borne in mind that the existing houses in the country and in country towns are not exposed to the competition of new houses, as are existing ones in London and in or near large towns. The consequence must necessarily be that house property in the country will now probably advance slightly in value—at any rate, it is hardly likely to recede. It must, of course, be noted that many more people live at such places as Bournemouth, Hastings, and so forth, who formerly would have lived in some country town, and consequently, except in the case of professional persons, there is not the same desire now as there was to live in a small provincial town. But it is obvious to any observer that the small country towns do not grow in size. Hence the demand for houses in them is not over-supplied, and so owners not only of purely country houses, but of houses in or close to quiet provincial towns, may regard the immediate future without misgivings.

But it is doubtful if the same hopeful view can be taken of house property in or near London and in or near the great towns. It does more than stand still in value; on the whole it depreciates. The same causes which are now tending to steady the value of property in the country are tending to depreciate it in the large towns. The abundant supply of money enables builders to go on opening up new districts and erecting new houses. New houses have always an attraction for many people, and a few modern additions, such as electric bells, attract residents. In a word, the supply exceeds the demand, and it is the existing houses which, in consequence, suffer most. The shipping industry has recovered its prosperity very much because there came about a cessation in the building of new ships—but there is no cessation in the building of new houses, because the new houses get as a rule taken up, whereas a new ship was practically no better than an existing one in good order, and so the new and the old ship competed on equal terms. We look, therefore, to the value of house property in London, Liverpool, and other great towns falling in value. There is no reason why the speculative builder should cease his operations, for he can get rid of his new houses, and he cares not what may befall the purchaser five or ten years hence. Of course, there may arrive a time when the supply of houses is so much above the demand that there will be a cessation in the erection of new buildings. But the immigration to London and the large towns, and the increase of population, keeps up a demand sufficient to prevent a regular crash, but not enough to prevent a gradual diminution in the value of existing houses. The great moral for the ordinary individual to bear in mind is to be cautious before he buys a house in a new district, and to see if he cannot find in parts where the tide is ebbing somewhat better value for his money than in newly-erected buildings.

Industrial Exhibition in Gothenburg.—The Artisan and Industrial Association of Gothenburg has decided upon holding an industrial exhibition in that city in the summer of 1891.

NOTES.

IN the letter which the London County Council have addressed to the Board of Trade concerning Major Marindin's report on electric lighting in London, they express their approval generally of the recommendations made therein. Some suggestions, however, of considerable importance are made. The Council propose that ultimately subways or conduits shall be constructed by them, and that, to prevent the constant opening up of the roads, the electric lighting companies shall be compelled to use such subways for their cables, and shall pay rent for such use. The Council further suggests that companies who have their cables already laid shall be compelled to move them into the subways when constructed, but that, as a set-off against the expense of removal, they shall be allowed three years' rent. This seems very hard on the pioneer companies, for the allowance of three years' rent will certainly not refund the capital sunk in the cable-ways and the expenses incurred in removal. In addition to this, there is a most serious point which the Council, from want of expert evidence, seem to have entirely overlooked. Between every few houses along the line of route of an electric cable there is a junction-box, and a joint made from which the smaller branch wires are taken into the buildings. It is obviously out of the question to make these junctions at exactly the same points in the subway, and in cases of enforced removal, the question of utilisation of the old cables deserves some consideration. The longer lengths of cable can doubtless be used again with a certain amount of waste, but unless a company would risk using a patched and mutilated main, the proposition practically means that the moment a new subway is constructed the companies in the district must entirely reconstruct their underground system. It appears to us that the hardship might be minimised in some such way as this:—The subway having been built, any new cable must compulsorily be laid in it; but so long as the companies merely require access to their junction-boxes, such access should be freely permitted. If any old cable requires renewal it might be a definite rule that the new one should be placed in the subway. When we consider the licence allowed to water and gas companies, we do not like to see a new industry seriously handicapped by such rigorous regulations.

THE Board of Trade are taking very prompt measures with regard to the new railway rates and charges, having already issued circulars to the railway companies and the objectors, explaining their views and offering suggestions. They have found that the protests which have been received may be roughly divided into two classes,—objections on principle, and objections on matters of detail. Under the first head are included such matters as "terminals" and short distance charges, while the differences arising upon the classification are placed in the second division. The Board of Trade have come to the conclusion that the first step to be taken is for the objectors and the railway companies to endeavour to come to an agreement upon the details of the classification, leaving the general conditions and other matters coming under the first of the two classes for future consideration. With a view to bringing about such agreements the companies have been requested to place themselves in communication with the objectors, and to arrange for interviews at which the disputed points may be discussed. This course will doubtless facilitate matters, if the parties approach each other in a proper spirit; and a settlement may be arrived at on some points much earlier than we anticipated last week, as the Department ask for particulars of the arrangements made (or the points still at issue, as the case may be) by August 1. We presume that interviews will be arranged for in various centres, at which attempts will be made to deal with as many individual objections as possible at the same time; and it is to be hoped that the result of the negotiations will be satisfactory, and the subsequent work of the Board of Trade thereby lessened.

IN Saturday's *Times*, Mr. Arthur J. Scott, writing from the Travellers' Club, raises an alarm which, if all his information be correct, ought to be attended to at once, as to a proposition to remove the Boulak Museum at Cairo from its present building to the palace at Ghizeh, on the ground (as stated) that the latter is a more attractive holiday site. Mr. Scott says:—"The palace of Ghizeh is totally unfit for the purposes of a museum. It is one of the numerous palaces built by the Khedive Ismail in the heyday of his extravagance, and, though it must have cost a very large sum of money, it is already in a dilapidated condition. The roof was never properly finished, and admits the rain in every direction; the floors and walls are unsound, and quite incapable of supporting the weight of the collection and of visitors; the lath-and-plaster cornices and ceilings are cracked and falling to pieces, and no amount of money can render it a suitable building for the exhibition of the objects of art proposed to be placed in it." The Boulak Museum is such an exceptional and valuable one—now of European fame—that in view of the correctness of this information as to the proposed new building, a strong protest ought to be entered by English archæologists, who are, perhaps, of all nations the most interested at present in Egyptian antiquities. Perhaps the newly-formed Society of Egyptian Archæologists will turn its attention to the matter.

AS the rating of ground-rents has now become a subject of practical interest, it cannot be too fully discussed by competent persons. We are glad, therefore, to see that Mr. George Beken recently read a paper on the subject at the Surveyors' Institution. We are inclined to agree with Mr. Beken that legislative interference is not very desirable, in the interests of freedom of contract, at least as regards existing ground-rents, because it is obvious that the landlord has made his bargain with the lessee on the terms that his ground-rents will not be taxed. This objection, of course, does not apply to the taxation of new ground-rents; but it is clear that, if they are to be subject to a tax, it will fall ultimately on the occupier. There is no legislative way of preventing this incidence of taxation, because even if the law declared that the ground landlord is to pay the tax, he can still raise the rent to a figure which will recoup him for the payment of the tax, and this increase of rent will ultimately come out of the occupier's pocket.

WE have received from Mr. George Trollope a printed report of the case of Kinnaird *v.* Trollope, which was decided last year by Mr. Justice Stirling. It will be also found chronicled in the Law Reports (39 Chancery Division, page 636). It has long been settled that when a mortgagor repays the amount borrowed on his property, he is entitled to receive back from the mortgagee the title to the property in its place. The case, in which Mr. Trollope was interested against the Provident Life Office, decides that the same rule applies when the mortgagor has parted with his equity of redemption. The point is essentially one of a legal and technical character, more interesting to lawyers than to builders, as the latter would hardly consider such a question without the assistance of a legal adviser.

MR. WILLIAM WATERSTON, builder, Edinburgh, has conveyed to the Edinburgh Merchant Company property at the west end of that city of the value of 30,000*l.*, to be held in trust for the benefit:—(1) Of aged members of the Company in reduced circumstances; and (2) Of respectable men above sixty years of age who had been employed as workmen in the building trades. Mr. Waterston suggests that the benefits should be conferred, not in the name of charities or pensions, but as gifts from friend to friend with hearty good will. The Merchant Company administer large funds for educational and other purposes, and as Mr. Waterston was, at one time, a Governor of its trusts, he is in a position to know how they were managed.

THE Directors of the Royal Asylum for Lunatics, Edinburgh, have approved of plans for a new asylum prepared by Messrs. Sydney Mitchell & Wilson, architects. The ground-plan is in the form of the letter E, with an elongation of the central projection backwards, the open face being towards the south. The architectural style adopted is the later phase of the French Renaissance. The central feature of the design is a great hall, with a high-pitched roof and tower 32 ft. square, rising to a height of 100 ft. At one angle of the tower there is corbelled out a circular stair turret, which rises over the balustrade of the flat roof. Other towers are introduced at the angles, and on the faces of the south projections and wings, which rise to a height of 75 ft., and are capped with bell-shaped roofs. The projections are finished with decorated pedimented gables. The materials to be employed are red sandstone with yellow freestone dressings, the roof-covering to be of green slates. The building will occupy a richly-wooded height, and will form a conspicuous object in the landscape. The cost of the building and accessories is estimated at about 60,000*l.*

THE Committee of the Naval and Military Exhibition to be held in Edinburgh have decided to open the exhibition in the galleries of the Royal Scottish Academy, on the anniversary of Waterloo, Tuesday, June 18. Already numerous portraits of Wellington and Napoleon have been sent, and many of the articles to be entrusted to the care of the Committee are of great intrinsic value, the collection of medals alone being estimated as worth many thousands of pounds. In the meantime, an insurance has been effected with Lloyd's for 40,000*l.*, to cover risk from the time the articles leave the possession of the owners until they are returned.

A PAPER on water-supply for small towns and villages, read by Mr. R. E. Middleton, C.E., before the Civil and Mechanical Engineers' Society in April last, shows that water may be collected in the greensand formation and other water-bearing strata by pipes laid in trenches, which are afterwards filled in with sharp sand, with which stones may be mixed when sand is not plentiful. In one case Mr. Middleton found the natural porosity of the greensand to be about one-fifth of that of loose sharp sand. The length of collecting-pipes for a small town of 3,500 population, in the West of England, was 594 yards of 9 in. diameter, 352 yards of 6 in., and 1,342 yards of 4 in., the water being delivered to the town through a 4-in. cast-iron pipe. Taking into account the cost of the service-reservoir and the distributing-pipes, the total cost per head of the population was 22s. 10d. In a village of 600 inhabitants, the cost was 73s. 4d. per head; but this large amount per head is accounted for by circumstances which were not of a favourable nature. Another instance is a village of 1,250 inhabitants, supplied at a cost of 39s. 3d. per head. A comparative statement of cost, however, is better shown by the annual charge, and, the money being borrowed at the moderate rate of interest usual in such cases and repaid in equal annual instalments extending over thirty years, the annual charge in the first of these cases is 1s. 9d. per head, in the second 5s. 4d., in the third 2s. 1½d. for that time; but afterwards only 9½d., 3s. 3½d., and 1s. 9½d. respectively. In these three instances the water is supplied by gravitation. Two more were referred to where the water is pumped from low ground to a sufficient height; in one of these the population is 6,000, and the cost was 30s. 4d. per head. In the other case, with a population of 2,000, the cost was 54s. 6d. per head. The annual

charges in these cases are, for the first thirty years, 2s. 3¼d. and 5s. 8½d. respectively, and after that period 11½d. and 3s. 8d. In most cases the cost of a water-supply would lie between these two extremes.

THE report of Mr. J. Wolfe Barry, C.E., on Ballycottin Pier, County Cork, shows the complaints made against its construction and stability to have been much exaggerated. After personally examining all parts of the pier with his assistant, Mr. Gifford, he came to the conclusion that two parts only of the pier required any work to be done. He recommended that the head of the new pier be strengthened with stout galvanised iron bands, carried back to and connected with the main portion of the pier. The bands, though galvanised, would after a time suffer from corrosion, but they would last many years if painted after the zinc coating had worn off, and they could be easily and inexpensively replaced when necessary. The new pier is an extension, 340 ft. in length, of an old one erected in 1847. The head of the old pier projected into the harbour 100 ft. This portion was to have been removed completely away, but some of the *débris* appears to have been spread on the bed of the harbour, and although this did not exist to any great extent when Mr. Barry made his report (December 21, 1888, although only recently printed and issued), it was higher than it ought to have been, and he recommended that the harbour be at this part deepened. The inner and outer walls of the pier are of concrete. The mode of construction contemplated under the contract was that up to the level of low water of ordinary spring tides it should consist of blocks of Portland cement concrete, weighing about five tons each, placed in position by divers; but after the contract was let, the contractor, Mr. Martin, offered, without extra charge, to construct this lower part with blocks weighing from twenty-four tons to fifty-three tons in the outer wall, and from twelve to fifty-five tons in the inner wall, an offer advantageous to the stability of the work, and which was accepted. The height from the foundation to 3 ft. above low water was thus raised in two tiers, a height of about 21 ft.; the upper, 12 ft. to the roadway, 3 ft. above high water of ordinary spring tides, being formed of concrete mixed *in situ*. The depth of water at the pier-head is about 13 ft. at low-water, and the range of a spring tide about the same. The bottom is sand; and, on the evidence of the diver, is easily moved in stormy weather, and notwithstanding that the foot of the wall is protected by rubble stone, two decided cracks in the pier-head were produced by the violence of the waves. Small and less important cracks also occurred in the mass of concrete deposited *in situ*, but these did not indicate any movement of the wall, and were probably due to the contraction of the material, which often takes place in great lengths of concrete made in one piece. On the whole, the report must be considered to vindicate the design and construction of the pier by the engineers of the Irish Board of Works, by whom it was transferred to the keeping of the County Surveyor, acting on behalf of the Grand Jury of the County, who declined to accept it unless the Government procured an independent report upon its actual condition. These difficulties have often arisen in Ireland from the divided responsibility of these two great authorities,—the one local, the other a department of the Government of the country.

ON August 28, 1886, we published a view of Ightham Mote House, near Sevenoaks, amongst our illustrations of the excursion in that year of the Architectural Association. This singularly interesting specimen of a fourteenth-century fortified dwelling-house is now in the market, and will be put up for sale by auction at the Mart on the 9th July next, by order of the late Mr. Charles Selby Bigge's executors. To what we said in our descriptive text on 21st August, 1886, we may here add that the property, being about 580 acres in all, is divided into nine lots, whereof eight are set apart as sites for building purposes. In the same month will be similarly offered for sale another notable mansion,—Hengrave Hall, situated within three or four miles of Bury St. Edmunds. This house was built by Sir Thomas Kytson, in the year 1525, and was since occupied by the Gage family. The whole property, including the home park of 300 acres, extends over nearly 4,600 acres, whereof the River Lark forms the northern boundary. The sale includes the old parish church, now in ruins, supposed to have been dedicated to St. John Lateran, together with the manors of Hengrave, Fornham, Risby, and All Saints; of this latter unfortified house we gave two or three sketches, together with a brief account, in our numbers for August 16, 23, and 30, 1884.

DR. THEODOR SCHREIBER, Professor of Archæology and Director of the Museum at Leipzig, is about to edit a work which will be of great importance to archæologists. It is to consist of a series of hitherto-unpublished Hellenistic reliefs, reproduced in heliogravure. There are to be in all 112 full plates and a volume of text, illustrated with a large number of cuts, the whole to be under the auspices of the Philologisch-historischen Classe der Königlich-sächs. Gesellschaft der Wissenschaften, and to be published by Engelmann, Leipzig. The publishers promise that the work shall be complete at the end of the year, at a cost of 220 marks (*i.e.*, about 11*l.*). The number of "series" of this sort is constantly on the increase; their value to science is undoubted, but their cost is great. We would suggest that the publishers would do well, and would secure a larger number of purchasers, if they would at the outset publish a list of the plates to be issued. In a work of this magnitude the reliefs to be published must necessarily be chosen long in advance, and purchasers would know where they were. We may add that an *édition de luxe* is to be published at 16*l.* 10s. The number of copies issued in both editions will be small.

PROFESSOR WALDSTEIN, in a letter to the *Times* of Tuesday, records his conviction that the supposed discovery, some time ago, of the tomb of Alexander the Great at Sidon is something more than a mere archæological flourish. He says that the photographs of the fragments discovered, which he has since seen at Constantinople, have convinced him that the discovery is one of the most important made in this generation. Professor Waldstein says—

"There are several sarcophagi of various dates, showing an interesting development of tombs of the Lycian type, some reminding us of the monuments from Xanthus in the British Museum. But one of these stands apart for its supreme beauty. It has pediments containing relief in which the polychromatic additions are wonderfully preserved. These reliefs are unique in character. In style they remind us of some of the friezes from the Mausoleum of Halicarnassus, and can hardly be later than the beginning of the third century B.C.

The subject of the one pediment,—a representation of a lion hunt,—is quite clear, inasmuch as it contains an undoubted portrait of Alexander."

It is to be hoped that we shall not have to wait long for published illustrations of a discovery of such unusual interest.

IN the June number of the *Classical Review*, Mr. Murray draws attention to a beautifully-engraved gem recently acquired by the British Museum, and which he thinks may throw light on a very interesting and much disputed question, *i.e.*, the origin of the ægis of Athene. The gem (found at Amathus) represents a figure of Athene, but after a quite exceptional manner. Behind her neck is the Gorgon's head in profile, lower down the snakes of the Gorgon, which latter formed the fringe of the ægis, then a pair of wings also belonging to the figure, in fact, her whole *cruvia*. This certainly seems to illustrate the passage of Herodotus, iv., 189, where he states his opinion that the Greeks got their idea of the dress and ægis of Athene, as seen in her statues from Libya, where it was the custom to go clad in skins of animals which were called "ægises" (*αἰγίδες*). From Dion Chrysostom (Orat V.) we learn that the skins were worn behind, so as to leave the face and breast bare; in fact, just as Herakles wore his lion-skin. The ægis, then, is the skin and spoils of the Gorgon. In accordance with primitive custom, Athene threw them over her neck and shoulders, and only later began to wear them on her breast. Mr. Murray thinks that in archaic vases, wherever only a fringe of snakes is visible, the head of the Gorgon may possibly be conceived of as actually on the back of the figure. He might have cited the charming Berlin vase, in which Athene appears at the birth of Erechthonios; here the ægis is clearly worn over the back. We should be glad to be rid of the "storm cloud" interpretation, only if the ægis be the *cruviæ* of the Gorgon, what is to become of Zeus the ægis-holder? and, still more, what is Mr. Lang to do with his ægis and the goat totem? The gem, we hope, will soon be published.

THE *Berliner Philologische Wochenschrift* (June 1, 1889) reports the discovery of an interesting mosaic at Sparta. It is of quadrangular shape, and made up of quadrangular pieces of stones, fitted together with the utmost care and nicety. In each corner is introduced a portrait of some famous person. Two are inscribed. The one—admirably preserved — represents Sappho (ΣΑΠΦΩ), the other, which, unfortunately, is very indifferently preserved, represents Alcibiades (ΑΛΚΙΒΙΑΔΗΣ). Sparta is very rich in mosaics, but those discovered hitherto are coarse in style. Representations of Sappho are rare, and this portrait is a welcome addition. The same issue of the *Wochenschrift* notes, with regret, that the negotiations for the excavation of Delphi are again brought to a deadlock, owing to the refusal of the Austrian Government to pay certain loan moneys. The inhabitants of the village of Kastri are not unnaturally beginning to show symptoms of discontent. How can they attend to their business with this uncertainty of removal constantly hanging over them? Delphi has pretty well gone the round of the markets of Europe, and perhaps local agitation may supply the needed stimulus.

A REPORT by Dr. Parsons to the Local Government Board (March 15) deals with the causes of an outbreak of diphtheria at Camberley and York Town, in the Parish of Frimley, in the Farnham Rural Sanitary District. The inspection was directed by the Board at the request of the Farnham Rural Sanitary Authority, and was made in January, 1889. The following are among the causes of the outbreak suggested in the report:—

"Nearly all the cases of diphtheria have occurred in houses in damp situations. In Obelisk-street and Princess-street, Camberley, the roadways are, or were at that time, unmade, the surface being a filthy quagmire; they have since been partially put into repair. The soil is damp, in places quite boggy, and the water-level in wells is but little below the surface. Pembroke-cottages, near the bottom of Princess-street, form a row of eight concrete cottages, a good deal out of repair. They have no through ventilation, and the floors are almost below the level of the ground. There have been cases of diphtheria in five out of the eight houses, but there were abundant opportunities for the spread of the disease by personal intercommunication between the inmates of different houses. . . . Several of the houses invaded were also damp through defective eave-spouting. The houses invaded were, for the most part, comparatively modern cottages, semi-detached or in rows. . . . The sewers discharge by two outfalls on a piece of irrigation ground in the low ground near the Blackwater. The sewers are of pipes, and are intended to convey only sewage and (in part) roof-water, road-water and sub-soil water being excluded, though a good deal of the latter finds its way into the sewer in Princess-street. The joints of the Obelisk-street sewer, which was open at the time of my visit, were imperfectly made and leaky. The sewers are ventilated by tall shafts, and by grids at the street level; from some of the latter, offensive smell is complained of. . . . . The inlets of the house-drains are as a rule out of doors, the sink-pipe discharging over a trapped gully. *The sink-pipe itself is often untrapped,*

and hence any foul smell arising from the fur with which it is apt to get coated, especially when of any considerable length, or of wide calibre, is able to enter the house. The closets at cottages are usually hopper-closets connected with the drains; *they have no water laid on to them, and are supposed to be flushed by pouring down water by hand*; the quantity of water thus used is, however, often insufficient to keep the drains clean."

We italicise those two sentences: the latter because that farce of closets supposed to be flushed by pouring down water by hand is over and over again coming up in these reports, and is one of the worst of the insanitary conditions prevalent in poor neighbourhoods and inferior cottage property. It is always practically found that flushing by hand means not flushing at all. And we draw attention to the matter of the untrapped sink wastes because that is a point on which there is a great heresy even among sanitarians. It is constantly being laid down that a sink-waste discharging over a gully requires no trap or bend under the sink. The result of this, as stated in Dr. Parsons's report, is that there is almost always an offensive smell at the sink from matter that has adhered to the sides of the waste-pipe.

MR. SPEAR'S report to the Local Government Board upon an epidemic of scarlatina in the Faringdon Rural Sanitary District, and upon the sanitary administration of that district, dated April 4, condemns the administration as very inefficient. The report says:—

"The Poor Law Medical Officers are the Medical Officers of Health for their respective districts. In each case the salary is 10*l*., no part of which has been repaid from the Parliamentary grant. . . . . The Medical Officers of Health report at quarterly and yearly intervals. In the reports presented for the last three years (including the annual reports of 1885), I can, except in one instance, find no definite information regarding the sanitary condition of either of the four districts. The exceptional instance is that of a report by Dr. Miller, late Medical Officer of Health for the Lechlade District, who, *à propos* of an outbreak of typhoid fever in the second quarter of 1886, states that he had made a house-to-house inspection of the greater part of the village of Lechlade, and found that the well-water was in a large majority of cases polluted by surface filth. The effect of the Medical Officer's activity in this single instance is noteworthy. Following it, the Authority entered upon a scheme for supplying Lechlade with water from a general source. The Medical Officer of Health complains in the next annual report that he had not been consulted upon the proposed scheme, and expresses some doubt, apparently with reason, as to the freedom of the projected source of water-supply from risk of contamination. Moreover, up to the present date, little progress has been made with the work. Still the fact remains that when adequate representation was made to the Sanitary Authority notice was taken of it, and action was thereupon commenced.

The remaining reports have consisted chiefly of complaisant remarks upon the health of the district and congratulations upon its sanitary state."

In reference to the sanitary mechanism of the district, the Report makes the following among other criticisms:—

"The private drainage of the town is very defective. A large number of houses are provided with pan or hopper closets, connected with the sewers, *but having no flushing apparatus*. These are generally very foul, the water-supply available being scanty, and flushing accordingly neglected. Ventilation of the inadequately-flushed drains, which discharge into wholly insufficiently ventilated sewers, is almost unknown. In many cases drains pass beneath houses, no special precautions being used, and gullies with direct connexion are occasionally within the houses (cellars, &c.). The escape of drain air in and about houses is a common cause of complaint. . . . . The house accommodation of the town requires much attention. The cottages are often very small, the rooms ill-ventilated, and occasionally overcrowded. Dampness, both from the roof and from the foundations, is little guarded against; certain houses in Foundry-yard, for example, are quite unfit for habitation from this cause."

WE hope that the publishers of the new edition of "Chambers' Encyclopædia" (the third volume of which has just been published) will forgive us for saying that they show a customary Scotch incapacity for seeing a joke, otherwise they would hardly have admitted in the preliminary list of "important articles" that of the Channel Tunnel, the author of which article is in the same place stated to be Sir Edward Watkin. When the article itself is referred to, the matter is still more amusing, for, as we all know, no such thing as the Channel Tunnel exists,—there is only an experimental boring on either side of the Channel, and these borings together are not more than one-tenth of the proposed tunnel. Sir Edward Watkin's article is, therefore, obliged to deal with the future, and to describe what the Channel Tunnel would be if at some future day, which at present is certainly very distant, Parliament were to sanction the scheme. It has been said that one of the causes of some great men's success has been their care for little details, and certainly Sir Edward Watkin, when he obtains the insertion of an article in this "Encyclopædia" about his cherished scheme, shows an amusing regard for a small bit of advertising.

ARCHITECTURE AT THE ROYAL ACADEMY.—VII.

1938. "Design for Apse Window, Ranmoor Church, Sheffield": Messrs. Shrigley & Hunt. A two-light window of unusual design; the subject is the Resurrection; in the upper portion of one compartment is the figure of Christ risen, in the other two angels adoring: their wings form part of the colour background of the scene. These figures are all in nearly white drapery, giving a bright appearance to the upper part of the light; below are two guards in armour, one sleeping, the other looking up as if aroused. The small lights in the tracery head are filled with cherubim. There is a great deal of originality, and a fine broad effect, in this design, which seems, however, to want more leading to give it the true constructive character of stained glass.

1941. "Design for Memorial Window to Admiral Blake in St. Margaret's Church Westminster": Mr. E. Frampton. The recognised necessity of making a church window religious in subject and figures has led to a rather high-wrought treatment of this memorial to a sea-captain who, great as he was, is not exactly associated in our minds with Michael combating the dragon, which fills one of the three compartments of the window; the figure on the other side we do not understand, it appears to be that of a saint trampling on fire; the centre compartment, representing Peter sinking and Christ on the sea saving him, Blake would not have liked, as he would have said he was in no danger of sinking on the sea. The conception of the whole seems to us puerile; the design of the main compartments, with the upper portions of the three figures relieved against a representation of sky, and the elaborate canopy work over, is good and effective. Subjects illustrating the death and the state funeral of Blake form a predella.

1942. "House and Studio, Avonmore-road": Mr. Jas. M. MacLaren. A pleasing bit of domestic street architecture, to which some special character is imparted by the arrangement and design of the windows, and the decorative adjuncts applied to the principal ones.

1946. "Salisbury Cathedral from the South Transept": Mr. Jas. Cafe. A water-colour drawing very successful in regard to aërial effect and the representation of the varied tones of masonry in sunlight shadow and half-light; in this respect it shows much artistic feeling, but it is a weak drawing in regard to texture and detail of execution, in comparison with the complimentary position which has been assigned to it.

1947. "Church of St. Ethelburga; the Chancel": Mr. H. D. Wilkinson. Apparently this represents some decoration to the chancel, shown in a pen-and-ink drawing, and the addition of a vestry &c., shown in a small plan, but not illustrated in the view. It is an effective drawing of the kind, but conveys no indication as to what is specially intended to be shown.

1950. "The Falcon Cocoa-house, Chester": Mr. John Belcher. A small water-colour drawing showing a charmingly-picturesque half-timber house, we presume new work in imitation of the old Chester style.

1951. "Project for west window of Chesterfield Church": Mr. F. Hamilton Jackson. This is a broadly-executed study, on a small scale, for stained glass for a large seven-light Late Decorated window with a number of subjects, which do not explain themselves very well on this small scale. The general effect of colour is good, and the treatment shows a thorough feeling for stained-glass effect; but it is to be hoped the proportions of the figures will be revised in detail; many of them are very lengthy.

1952. "Keble College Chapel, Oxford": Mr. Cecil B. Roper. This, a small pen-drawing of the interior of the chapel, merits notice for its manner of execution, in which a great deal of softness of effect has been obtained by the manner of working entirely in small and broken touches.

1955. "New School Buildings at Repton, Burton-on-Trent"; Sir A. Blomfield, A.R.A. Two blocks of red-tiled buildings in simple Domestic Gothic style, with mullioned windows and battlemented parapets between the gables. A porch or arcade of three pointed arches between buttresses forms a feature on one side. It is a pity no plan was given. The drawing is a good example of architectural water-colour drawing, clearness of definition of the buildings being the principal object, but the landscape is sketched in with much truth of tone; the sky is particularly good.

1956. "St. John's Church, Stanstead Montfitchet; west end": Mr. W. D. Caroë. A large coloured drawing of a brick church with stone dressings, very effectively executed, in which the prominent object is a massive and richly-treated tower of Late Gothic type, with pinnacled and battlemented finish. As in the case of another tower design of similar type before referred to, we question whether the slated "spike" appearing above the battlements is any improvement to the effect of a tower of this kind, the characteristic of which is squareness and solidity; the addition of the spirelet introduces another kind of effect, not in keeping with the main architecture.

1958. "Church Porch, Louviers": Mr. C. O. Murray. A powerful and effective etching, hung too high to be seen in detail.

1959. "West Front of the Cathedral, Honolulu": Messrs. Carpenter and Ingelow. A coloured elevation, more in the style commonly adopted in France than in England. There are two towers, perfectly plain in the lower portion, with long louvred windows above, and square slated spires with similar broach pinnacles at the angles. Between these is a gable, and beneath, three two-light windows filling up the front, with early Geometric tracery in the heads. A porch with three arches on cylindrical piers projects below beneath a lean-to roof, with gables over the arches, and sculpture in the tympana over the doors within. The whole, though very plain, has a fine character and individuality about it. The drawing affords a curious instance of the kind of optical illusion which the Greeks devoted themselves in so scientific a spirit to correcting; for, whether from the effect of the falling-in lines of the tower buttresses at the two extremities of the front, or from that of the gable lines over, the three large windows appear distinctly to spread slightly outwards as they rise. It does not follow necessarily that this illusion should be presented by the building in execution. We have observed it in drawings more frequently than in actual buildings.

1960. "New Premises, Eastgate-street, Chester": Mr. T. M. Lockwood. A creditable specimen of the modern timber front built in imitation of the old Chester style. It would be quite possible, however, to design street fronts to harmonise with old Chester without adopting this rather perishable manner of building, which, moreover, adds distinctly to the danger from fire in the town. Mr. Lockwood makes the most of a conventional Roman structure in Eastgate-street, which was built as a bank, as a foil to his own more picturesque front: a building, however, which was thus treated, we believe, against the wishes of its architect, and to gratify the ideas of the typical English banker, who does not believe he has a bank unless there are Classical columns or pilasters to it. An improvement on the British banker's conventional idea is seen however, in

1961. "Lancashire and Yorkshire Bank, Manchester": Messrs. Heathcote and Bandle. This is a large mechanically-executed pen drawing showing a costly building in Classic style, in which the architects have succeeded in giving something of the expression proper to a bank by the employment of massive square rusticated piers, with great depth of reveal, in the lower portion of the design; these, however, represent two inner storeys in height, as seen by the

windows, so that the monumental expression is somewhat disturbed. The piers are relieved by escutcheons midway, breaking their line with good effect. The design belongs to the class of "handsome" buildings (some of our readers will understand the sense in which we use the expression), but it is a good specimen of the type.

1962. "New Offices, Carey-street, Lincoln's Inn": Mr. George Sherrin. This is rather an unnecessarily large drawing of a small but effective and picturesque bit of new building at a street corner behind the Law Courts. The building looks decidedly better in reality than it does in this drawing, which is ineffective and in a poor style of drawing. A small plan is given, and we may add (what the drawing does not show) that the interior treatment of the corridors and the circular stair-well is very good and effective. We may point out however, that the street front would have looked much better if the ground-floor windows had been partially filled with almost any kind of framing or mullions, instead of being left as great oblong holes filled up only with (we presume) a piece of plate-glass. The heavy carved panels and slightly-projecting bays over these empty spaces look weak and in want of support.

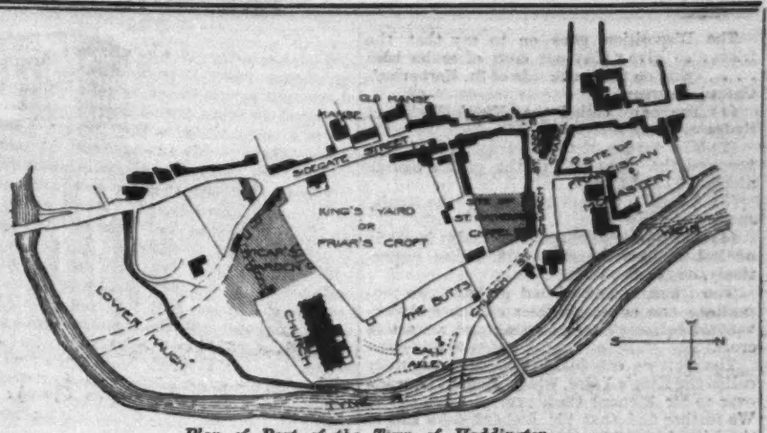
1965. "Board School, Rathlern-road, Catford Bridge": Mr. T. J. Bailey. This is a small and rural-looking Board School, partially in one story, with low walls, high roof, and gabled window bays carved above the eaves: otherwise it is in accordance with the traditions of London Board School architecture. It is shown in a drawing effectively tinted in Indian ink. Two plans are given, but the drawing is too high for them to be seen.

1966. "New Church, Barmouth, North Wales": Messrs. Douglas & Fordham. There are a great many drawings of churches on hilly sites this year, in which the nature of the site has evidently influenced the design. This is a fine and effective drawing tinted in brown, of which we published a reproduction in the *Builder* last week, to which we refer the reader. It is a church of late Decorated character, and of very solid construction, with a low massive heavily-buttressed tower (the right way to build among hills). The aisle on the lower side of the ground, which is next the spectator, has only a row of small square-headed windows under the eaves, with a mass of plain buttressed walling below. It is to be presumed that the interior floor is far above the ground level on this side, but what use, if any, is made of the space below there is nothing to show. In a picturesque point of view the drawing is one of the best in the exhibition, and occupies a central position on the west wall of the room.

THE CHURCH AND OTHER ECCLESIASTICAL FOUNDATIONS AT HADDINGTON.*

HADDINGTON dates as a Royal burgh from the reign of David I., 1130. It was occupied as a Royal residence till the early part of the thirteenth century, when it was considered disagreeably near the English border. The Royal Palace was situated in King-street,—now called Court-street,—on the site of the present County Buildings and Court Houses. Remains of some of the vaulting of the ground-floor of the Palace are said to have been removed when the Court Houses were built (1833). Alexander II. was born, in 1198, in the Palace of Haddington.

There were in and about Haddington a large number of ecclesiastical establishments, to wit:—The Parish Church; the Franciscan Monastery; the Cistercian Abbey (of Nuns); the Chapels of St. Martin, St. Ann, St. Katherine, St. John, and St. Ninian; the Hospitals of St. Mary and St. Lawrence. Of these ten establishments there are now but scanty remains. The town and buildings suffered much at various times by fire. In 1216 part of the town was burned by King John of England. It was hastily rebuilt of wood. In 1244, on the same night as Stirling, Roxburgh, Lanark, Perth, Forfar, Montrose, and Aberdeen, Haddington is stated to have been totally consumed by fire. In the year 1354, when Edward III. of England was in France, the Scots took advantage of his absence and seized Berwick. On hearing this, Edward hastily re-crossed the Channel and marched north to Newcastle. Here he issued a proclamation for all loyal subjects to join his standard. He then entered Scotland, laying waste the whole country the length of Edinburgh, and burned "the town and monastery of Haddington, as likewise the church of the Minorites or Franciscans." This day is locally known as "Burnt Candlemas," the event having happened in February.



Plan of Part of the Town of Haddington.

Of the Hospitals, only remains of that dedicated to St. Lawrence are extant. It was situated one mile west of the town, and is said to have been built and endowed by James V. Besides a chapel and grave-yard there was a leper hospital there. Only a two-storey tenement of no architectural pretensions marks the existence of this hospital. A field near it is pointed out as the graveyard. The Hospital of St. Mary was in Haddington.

Of the Chapels, remains of St. Martin's alone exist. This chapel belonged to the Cistercian Convent, and is on the east side of the river, in Nungate. It is of early date, but of little architectural interest, unless it be to solve the problem as to the purpose of the square holes so frequently left through its walls. It is a rectangular building, measuring 54 ft. by 16 ft. internally, with a barrel vaulted roof. At the east end there is a narrow chancel arch, and evidence of the existence at one time of a small chancel about 12 ft. square. The site of the Chapel of St. Ann is denoted by the name "St. Ann's-place." The Chapel of St. Katharine was situated "fornent the Friar's Kirk." The site of the Chapels of St. John and St. Ninian are conjectural.

The Abbey of Cistercian Nuns stood one mile from Haddington, down the Tyne, where the village of Abbey still remains. It was founded in 1178 by Ada, Countess of Northumberland, the widow of Prince Henry of Scotland. This lady, the famous "mother of kings,"—viz., of Malcolm IV. (the maiden) and William the Lion,—dedicated the church to the Virgin Mary. It was richly endowed from temporal lands about Haddington and Crail, and held the churches of St. Martin's (Nungate), Garvald, Athelstaneford and Crail.

On Christmas Eve, 1358, the river rose in great flood, and seemed about to destroy the convent. One of the nuns, so tradition says, seized an image of the Virgin and threatened to throw it into the river unless the flood abated. It need scarcely be said that the water at once fell. In 1548, during the English occupation of Haddington, Parliament was convened here, and consent was given to Queen Mary's marriage with the Dauphin, and her education at the French court. The only remnant of buildings in connexion with this once splendid convent is the very fine old bridge. It is of three pointed arches, each built in five ribs, with filling-in between. At the Reformation, the greatest part of the lands belonging to the Abbey were granted to William Maitland, younger, of Lathington, Queen Mary's secretary. They were afterwards erected into a temporal lordship in favour of John, Master of Lauderdale.

We have now disposed of all the foundations mentioned above except the Monastery of Franciscans and the parish church. There is considerable difference of opinion, and consequently much heart-burning, as to the indentification of the existing church; some hold it to be the parish church founded by David I.; others hold it to be the Church of the Franciscans, founded in 1258, and dedicated to (?) St. Duthac. The question to be answered is in either of two forms:—(1) If this is the Franciscan Church, where is or was the parish church? or (2), and conversely, If this is the parish church, where is or was the Franciscan Church? There is, we shall find, sufficient evidence in post-Reformation records to answer the latter proposition.

At the time of the Reformation the chief lands of the monastery were made over to the town of Haddington. There is a document, written in Latin, from the Protocol Book of Thomas Stevens, in the Record Office, Haddington, quoting "The Disposition of the Friar's lands, kirks and houses, &c., in Haddington." This disposition, which was signed in 1559, gives the boundaries of the properties then transferred, and we shall endeavour to identify these boundaries.

The following is an extract from the Disposition translated into English:—

"We have given . . . . to the rieve bailiffs council and community of [Haddington] . . . . all and every our said place *church* houses edifices gardens and dove houses . . . . situate and being on the east side of the borough aforesaid between (1) the lane called the 'Frier Gowll' on the north, (2) the water of Tyne and the course of a certain pond on the east, (3) the high road which leads from the said borough towards the parish church of the same on the south, (4) and a certain waste land belonging to the said borough on the west." . . .

(1) There is a narrow lane, called at this day "Gowll Close," which we may assume as the northern boundary.

(2) On the east there is a short stretch of the river Tyne, then (southwards) the weir forms a mill pond.

(3) On the south there is a public road,—the continuation of the High-street leading from the burgh to the Nungate and towards the present church.

4. On the west there was a piece of waste land, because in 1676 the Burgh Records state, "The piece of waste ground at the back of St. Ann's Chapel was sold to George Anderson for 50 merks, feu duty 1 merk. Of course, nothing is naturally so difficult to determine as the boundary of a piece of waste land, therefore the exact line of this boundary is purely conjectural.

The other boundaries are, however, sufficiently accurate to make identification comparatively easy.

Upon this piece of land the Franciscans had their church and other monastic buildings. While excavations were being made recently for a drain through this ground some human bones were turned up, and some foundations were exposed at the places respectively indicated on the map annexed, affording additional evidence of the existence of a churchyard, or church and buildings on this ground.

* A paper by Mr. Henry F. Kerr, A.R.I.B.A., read by him before the Members of the Edinburgh Architectural Association on the occasion of their recent visit to Haddington. Chief authorities consulted:—Disposition of the Friars' Lands, &c., from the Protocol Book of Thomas Stevens, Record Office, Haddington. Signed 1559. Catalogue of Bishops (Spottiswoode's Account of the Religious Houses in Scotland) 1755. Trans. Soc. Antiquaries of Scotland, 1792. Statistical Account of Scotland, 1793. Caledonia, George Chalmers, 1810. Gazetteer of Scotland. R. & W. Chambers. 1832. Extracts from the Burgh Records of Haddington, published in the Haddington County Lists, 1834, *et seq.* New Statistical Account of Scotland, 1845. Baronial and Ecclesiastical Architecture of Scotland. E. W. Billings. 1852. The Ancient Church of Scotland. Walcot. 1874. Ordnance Gazetteer, 1882. Guide to the Royal Burgh of Haddington. Robb, 1888. Burke's Peerage.

The Disposition goes on to say that the friars also give "that our croft of arable land . . . . lying on the south side of St. Katharine's Chapel, between

(1) The gate called the King's Walls of Sydgate, *on the east*,*

(2) The garden of the Vicarage of Haddington, and the graveyard of the parish church aforesaid, *on the south*,

(3) A certain piece of land called 'the buttis,' *on the east*; and

(4) The aforesaid chapel lands, also formerly of Robert Shorts and Robert Wauss respectively, *on the north* . . . ."

The friars, therefore, had at least two properties,—one on which their church and conventual buildings were erected, and an arable croft.

The croft we can identify as that originally called the King's Yaird, which James III. made over to Sir Richard Cockburn, of Clerkington. We further find that Sir Richard gave this to the friars in 1477 for obits, &c., on the condition that if the friars ceased to perform the required services, the land should revert to Sir Richard and his heirs. At the Reformation, when the transfer of this land was made to the town, the friars did cease to perform these services, hence the Cockburns claimed the croft. The town, having been unaware of the condition on which it was held by the friars, had, in order to retain it, to make a special payment to the Cockburns. Haddington House was, in 1680, built on this land, and the croft was converted into a garden. This is the croft which, in 1792, led Dr. Barclay into the belief that the present church is that of the Franciscans, because "a field now converted into a garden, and which is still called the Friar's Croft, lies contiguous to the churchyard. . . . ."†

There are further links of evidence as to the Franciscan Church.

In 1561. The magistrates ordained that no person was to take stones from the "Hie kirk, or Frier's kirk, under pane of forty shillings." This is, conjoined with what here immediately follows, evidence that there were two churches, and that both were in a sorry state at the Reformation.

In 1572. Council ordained all the pavement of the Frier's kirk to be "transported to the Hie kirk and laid there."

Also. "Let in feu ferme to John Gray 3 roods of the Frier kirk lands, containing the Chalmer hall and kitchen—feu thirty shillings,"

Also. The east gable "of the Frier kirk, from the sole up," given, in gift, to Thomas Cockburn, Clerkington.

In 1573. Thomas Cockburn charged to demolish, cut down, and take away the east gable of the Frier kirk, "otherwise the town will cast down the same at his expense." Here is plain evidence that the parish church was retained somewhat at the expense of the Frier kirk, and that the Franciscan Church was sacrificed, and its lands feued off, and otherwise disposed of.

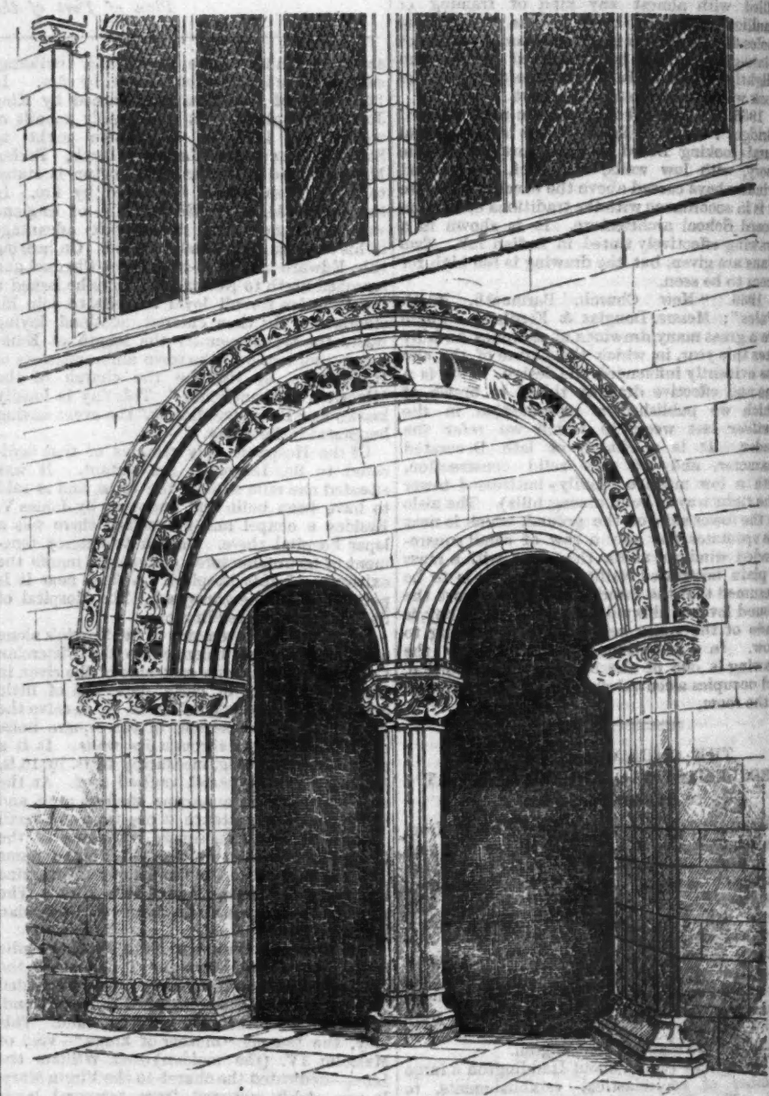
There is still one more link bearing upon the position of the parish kirk. In the Disposition which we have already quoted the lands of the monastery on which the church, &c., stood, were mentioned as bounded on the south "by the high road which leads from the borough towards the parish kirk of the same." Turning to the map, let us follow the road; it leads us directly to the churchyard gate of the present church, tending to the identification of the present church as the parish church. In an old print of Haddington‡ the churchyard appears to be of no greater extent westwards than is indicated on the map.

The last question for solution is, to which of the churches does the title Lucerna Laudoniæ—the Light of Lothian—belong? We cannot now speak as to the size or beauty of the Franciscan church. However, if we try to place a church of equal size with the present church on its lands, we shall find ourselves pinched for room. We are, therefore, tolerably safe in concluding that it was of considerably less size. Fordun and Major indicate the Franciscan church as the Lamp of Lothian, and it is quite possible that the Friar's Church was brilliantly illuminated throughout the night. But whether it was a more beautiful church than that now existing is open to doubt. It is, however, possible that the great beauty of the royally-endowed parish church, combined with the midnight vigils of the Friars, may have together given play to the fancy and force to the poetic figure of Lucerna Laudoniæ—the Lamp of Lothian.

The Parish Church of S. Mary was founded by David I., and endowed with the lands of Clerkington, on both sides of the River Tyne, and a toft in Haddington. In 1134, David I. gave this church to the Priory of St. Andrews, in perpetual alms, the church being served by a vicar. Haddington gave its name to a deanery. In 1558, the burgh records state that Sir James Mauchleyne was chaplain of S. James's Altar in the College Church of Haddington. In 1636, a second minister was appointed to the church of Haddington, as agreed at an Episcopal Visitation held the previous year.

At the Reformation, the lands pertaining to the church passed to James, Earl of Moray, bastard brother of Queen Mary. During the Regency they were usurped by the Earl of Morton. Thereafter they were forfeited by the Crown, and subsequently presented by James VI.

Haddington Church: View from the North-West.



West Doorway, Haddington Church.

* Probably an error for west.

† As for the identification of these boundaries. (1) The king's walls of Sydgate might refer to the wall of the King's Yaird in Sydgate. (2) There is no difficulty about the graveyard. From an old print it would appear that the graveyard did not formerly extend so far west as at present. It is, therefore, very probable that the vicar's garden adjoined the graveyard, lying between the graveyard and the public road. The old line of road is marked on the map. The vicar's garden, extending to the boundary of the King's Yaird, would certainly be in accordance with the bounds quoted. (3) "The Buttis." There is no doubt that here there was an old common, and evidence is still remaining of the games practised there, in the existence of the Ball Alley. (4) The probable position of St. Katharine's Chapel lands is marked on the map, and corresponds with the description recorded,—"Forment the Frier's Kirk."

‡ The same referred to in the note above.

to the Duke of Lennox as a temporal lordship. In 1620 the Haddington portion of these lands was bought by the Earl of Haddington, and in the eighteenth century purchased by the first Earl of Hopetoun.

The church, which is of cruciform plan, with aisles in nave and choir, is of very considerable dimensions, measuring, internally, 197 ft. 9 in. from east to west, 55 ft. 2 in. across the nave or choir, and 105 ft. 6 in. across the transepts. Its area is, therefore, fully 12,000 superficial feet, or equal to St. Giles' Cathedral, Edinburgh. The choir is of four bays, the nave of five bays, with a central tower 90 ft. high over the crossing. The whole church,—nave, choir, crossing transepts, and aisles,—was vaulted.

It may seem strange that so large a parish church should have been erected here; but we must not forget that this church was founded by David I., "the saur sanct for the crown," for a royal chapel in his royal demesne, and was, we have every reason to believe, established in a manner befitting the munificent founder of many of the finest ecclesiastical edifices that even yet adorn our land.

The choir and transepts are in great measure ruinous, and the nave has been sadly knocked about to form a galleried church to accommodate the requisite number of parishioners. Besides the modern doors inserted in the nave aisle walls, the walls themselves have been raised about 3 ft. for headroom in the gallery. A modern parapet has also been added. The nave aisle windows, on the north side, have had new tracery introduced, with the exception of the two-light window in the eastern bay, which has the old tracery partly restored. This tracery has cusping, of which more anon.

In the interior of the nave we find that the main arcade has been raised to admit the galleries. From the level of the top of the bases to the new work of the piers measures 8 ft. 8 in.; from the bases to the under-bed of the caps, 15 ft.; so that 6 ft. 4 in. of new work has been introduced. The difference of the old tooling from the modern is quite distinct even through the paint. The raising of the arcade has lifted the crowns of the arches above the level of the horizontal string course which crossed the vaulting shafts and returned along the west wall. This string course has been chipped away, but the line of it is distinctly visible about 8 ft. above the present level of the caps. The caps are painted to hide the red stone. The height of the vaulting-shafts is unaltered, the caps being level with the caps of the tower piers. These caps have on the north side of the church occasional interesting sculptures.

Bearing with us these points and noting the style of the carving of the caps, and especially the moulding of the responds on the west wall, seen just above the gallery floor line, a comparison with the choir in its untouched state will simplify our reading of the history of the edifice, for there are no records extant in connexion with the church of pre-Reformation date to assist us. If we measure the pier at the junction of the nave-aisle and north transept we will find it to be 8 ft. 8 in. from the base to the cap, exactly corresponding with the height of the old piers in the nave. Turning to the piers of the choir arcade, we find that while the caps are level with those of the nave, the piers measure 8 ft. 11 in. from base to cap,—*i.e.*, 3 in. more. We find here a strange thing,—these choir pier bases are 9 in. lower than the bases of the east piers of the tower. This is very awkwardly conspicuous at the responds on the tower piers.

The caps of the choir are of similar treatment to those of the nave; the arcade mouldings are identical; the string course and vaulting shafts follow the same design, although the caps of the vaulting shafts are varied. The return of the string course along the east wall is similar to that on the west wall of the nave. The responds on the east wall of the choir are identical with those on the west wall of the nave. All these points of resemblance in the interior are conclusive evidence of the nave and choir being of similar date. We will now consider the differences manifest on the exterior. The windows of the south aisle of the choir are gone, but there is no doubt they were similar to those of the north aisle. The clearstory lights, as well as the aisle lights, have cusping. It will be observed that the western window of the clearstory on both sides of the choir has caps in the jambs both within and without, while the other jambs have none. The east window has had its tracery and caps restored. As we pass along we observe that there are many curious sculptures on panels, label-stops, and elsewhere all round the building. The only flying buttress remaining is attached to a buttress of the south choir aisle.

When we come to the nave, we find a great absence of cusping in the tracery. The clearstory windows of choir and nave are of similar design, but the nave windows are uncusped. These are undoubtedly original, although in some places they have been restored. The aisle windows are, however, entirely different from those of the choir. They are of three lights, with the exception of the window in the eastmost bay in both aisles, which are of two lights and are identical with the choir windows. The two windows in the south aisle, adjoining that just mentioned, show the original design of the nave aisle windows, which were of three lights with cusped tracery. The remaining windows in the nave aisles, which are uncusped, are modern "restorations."

There are no remains of transept door, or south porch of the nave.

The buttresses of the nave are to a certain height similar to those of the choir and transepts, but their pinnacles are different. The nave buttresses show marks of having been rebuilt from certain varying heights, and the old pinnacles (sometimes miserably repaired) fitted on above. Even these old pinnacles do not seem, on close examination, to be the original ones. The west angle buttresses of the nave are set square with the wall, not canted, as those of the choir and transepts, and as is usual in "Decorated" work. Owing to the alterations, there are no indications of flying buttresses observable in the nave. The tower is, perhaps, the most beautiful feature of the whole fabric, and one of the most graceful lanterns to be seen in stone or on paper. It is most likely, as was suggested by a writer some years ago, that the tower was originally finished with an open crown, somewhat after the manner of St. Giles', Edinburgh. The corbellings on the cardinal faces of the tower lend probability to this idea, but owing to its ruinous state no further hints on the subject are left to us. The west doorway is formed of two semi-circular headed openings, with an enclosing semi-circular headed arch, with enrichment, supported on moulded jambs and central moulded shaft with fourteenth-century sculptured caps. On the cap of the central shaft there is carved a crown of thorns, with hands, feet, heart, and nails portrayed in relief. The doorway is a very superior piece of work to the somewhat coarse and clumsy window above it. The window is certainly of great dimensions, being 18 ft. wide.

We are now in a position to say that, notwithstanding natural differences in detail here and there, this church is practically of one date of erection. This we may affirm to be the fourteenth-century, after the burning of the buildings, in 1355, by the English. It may be observed that the nave is somewhat plainer in some portions than the choir,—notably in the clearstory windows where the tracery is uncusped, in the unmoulded jambs, &c., of the aisle windows, also in the interior where the walls above the arcade have been left rougher than in the choir. This may indicate that in the fourteenth century there may have been some lack of funds to prevent the design being completed in the fulness of the original intention.

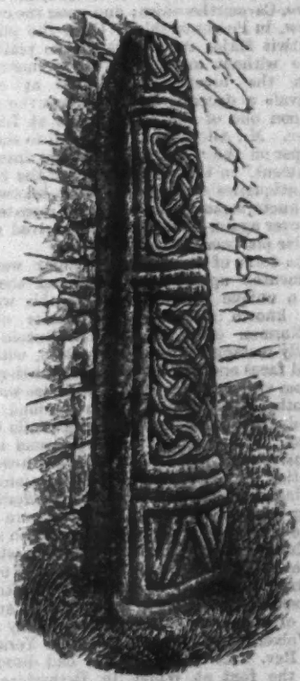
A word or two on the present condition of the remains. Notwithstanding the watchful supervision of H.M. Board of Works, it is highly desirable that something further should be done to keep the choir and tower from complete destruction. We cannot fail to notice a decided leaning of the whole choir arcade, east gable, and tower towards the east. This is gravely assisted by some of the piers of the choir being so much off the perpendicular. If these matters were looked to now, there is no reason to doubt the strength of the fabric to stand a roof, and thus be made to last for many generations.

"The Story of the Savoy."—In a "Note" last week we referred to an article bearing this title in the *English Illustrated Magazine* for the current month. We inadvertently attributed the sketches to Mr. Dewey-Bates, instead of to Mr. W. Harold Oakley.

Wesleyan Chapel and Schools, Kitto-road, Peckham.—Messrs. J. Jones & Sons, of 42, Farringdon-street, E.C., write to say that they have been entrusted with the order for the heating work, not the firm named by us last week.

THE CYLINDRICAL PILLAR AT LLANTWIT MAJOR.

AT a meeting of the Cambrian Archæological Association, held on Thursday evening, May 23, in the rooms of the British Archæological Association, at 32, Sackville-street, the Ven. Archdeacon Thomas being in the chair, a paper was read by Mr. J. Romilly Allen, F.S.A. (Scot.), upon the cylindrical pillar, ornamented with interlaced work, at Llantwit Major, Glamorganshire. The paper was a sequel to one upon the inscribed crosses at the same place, published in the April number of the "Archæologia Cambrensis" for the present year. The author stated that the pillar stood in the churchyard against the north wall of the old western church. It was carved out of a single piece of sandstone 9 ft. long, of which 1 ft. 6 in. was buried beneath the ground, the remaining 7 ft. 6 in. being above the surface. The cross-section was, roughly speaking, a circle of 1 ft. 6 in. diameter at the bottom, but only 1 ft. 2 in. in diameter at the top, so that the form of the pillar was really a truncated cone. The peculiar feature in the pillar was a vertical groove of V-shaped section running the whole way down the back of the stone. The groove was 4½ in. wide and 3½ in. deep. It evidently formed part of the original design, because the ornament was arranged to suit it. The whole of the convex surface of the stone was covered with elaborate sculpture, consisting of three panels of interlaced work and a sort of rude chevron pattern round the bottom. The interlaced work belonged to a class which might be called irregular broken plaitwork, which was intermediate between true plaitwork and knotwork.



Cylindrical Pillar, Llantwit Major.

Mr. Allen said that most persons must be familiar with the appearance of regular plaitwork, composed of two series of parallel bands, cutting each other at right angles and lapping under and over alternately. The same kind of fabric could be produced either by the operation of plaiting or by that of weaving, the only difference being that in one case the bands, or threads, ran diagonally with regard to the margin, whilst in the other they were parallel to it. The author then explained how a piece of ornamental plaitwork was drawn practically, by first dividing the surface intended for decoration into squares like a chess-board, but placed diagonally with regard to the margin.

The pattern was then produced by drawing the bands over the setting-out lines, and leaving breaks where one band crossed over another. In the irregular broken plaitwork which occurred on many of the early sculptured stones in Wales and elsewhere, part of the plait was designed in the manner described, but in places variations were introduced by

Part of Pavement, Siena Cathedral.

cutting off a band and joining it up to the next one, or to the next but one, parallel to it, or at right angles to it, instead of allowing it to run straight on in the usual way. A break was thus made in different parts of the plait. Instances of this practice were mentioned as occurring upon the Cross of Samson, at Llantwit Major; upon the Cross of Eivdon, at Golden Grove, Carmarthenshire; and upon the cross at Carew, in Pembrokeshire. Upon the pillar at Llantwit Major the breaks in the plait were made without any regard to symmetry, but when the breaks were made at regular intervals a decorative pattern was the result, as upon one of the other stones at Llantwit Major. Mr. Allen has endeavoured to show, in a paper on the "Analysis of Celtic Interlaced Ornament," in the "Proceedings of the Society of Antiquaries of Scotland," that knotwork,—*i.e.*, knots arranged in rows, and repeated over and over again,—was gradually evolved out of regular plaitwork in this manner.

The form of the Llantwit pillar was next commented upon. The groove at the back was a unique feature, of which this was the only known instance. The shafts of the pre-Norman crosses in Great Britain were usually rectangular in cross section, with two broad faces and two narrow ones, but they were seldom either square or round. There was only one other cross in Wales with a round shaft, namely, the pillar of Eliseg, near Valle Crucis Abbey. This belonged to a type found almost exclusively in the central and north-western counties of England, those at Stapleford, in Nottinghamshire, and Ilam, in Staffordshire, being good specimens. The shafts were round at the bottom but square at the top, each square face having a semi-circular termination where it dies away into the round. These pillars usually occurred in pairs, as at Gosforth, Penrith, and Beckermet St. Bridget, in Cumberland. Another type of pillar was round the whole way up, as at Wolverhampton and Masham, in Yorkshire. The Rev. Prof. G. F. Browne had discovered that the font at Wilne, in Derbyshire, was made out of one of these cylindrical pillars, the Saxon ornament being left, but turned upside down.

All these round pillars were of the Christian period, and had probably been surmounted by crosses. The Gosforth Cross still retained its cruciform top.

Mr. Allen concluded with a review of the various theories that had been advanced by different authors to explain the significance of the groove at the back of the Llantwit pillar. He referred to the description in Gibson's "Camden" where the "notable furrow" is compared to those produced by the weather on the Rollwright stones and others of the prehistoric period. Donovan, in his "Excursions through South Wales," has suggested that the groove "was designed for no other purpose than to admit the corner of a building, or some other kind of support." Mr. Allen thought that there might possibly have been a second pillar like the one now existing, and that a slab fitted into the grooves between the two. Mr. Worthington Smith's theory was that a wooden pole lay in the groove, and was surmounted by a cross, the pole being tied to the pillar.

Illustrations.

MARBLE PAVEMENT, SIENA CATHEDRAL.

THIS celebrated pavement is a unique work. It is an inlay of dark grey marble upon a white ground, with outlines and shading in black lines, resembling niello. It was designed and executed by various artists in the fifteenth and early part of the sixteenth century. A great variety of scenes and figures are represented in different parts of the pavement. They are chiefly from scripture or from the history of the Jews, as recorded by Josephus, but include also such subjects as the Seven Ages of Man, symbolical figures of Religion and the Graces, figures of sibyls, and the symbols of Siena and the cities allied with her. The names of many of the artists employed are lost, but those of Antonio Federighi, Giuliano di Biagio, Vito di Marco, Urbano di Cortona, Bastiano di Francesco, and Beccafumi have been recorded. Some of the grandest compositions are the later ones by Beccafumi, from one of which—the "Moses Striking the Rock" Mr. MacLaren* made the sketches which we reproduce in two double-page plates. The other plate is from a photograph of the pavement. From the inscription on the tablet in the typo-gravure it appears that the scene represented is the battle between Herod Antipas and Aretas, king of Arabia Petrea in which Herod was defeated and his army destroyed—a disaster which some of his subjects supposed to be a "judgment" for the murder of John the Baptist.† Josephus says the kings themselves did not fight, but sent their generals,—a circumstance represented in the picture, where the monarchs appear to defy each other at a distance, while the battle goes on between them. The city in the distance on the left is probably Jerusalem. The incident of the eagle defending her nest of young against a serpent doubtless refers to the chief cause of quarrel between the monarchs, which was the contemplated treachery of Herod towards his wife, who was the daughter of Aretas. The scene represented in the small illustration above is the battle between the Israelites under Jephthah and the Ammonites. In the foreground is the battle, while in the distance are represented the subsequent meeting between Jephthah and his daughter at the gates of Mizpeh, and his sacrifice of her in fulfilment of his vow. This scene was designed by Antonio Federighi, and executed by Bastiano di Francesco.

"HISTOIRE DE L'HABITATION: PARIS EXHIBITION.

THESE sketches are from the series of models arranged, under the direction of M. Chas. Garnier, along the end of the Champ de Mars adjoining the river, and intended as an illustration of the history of the habitation.

* These sketches were made by Mr. MacLaren during his tenure as Gold Medallist and Travelling Student (1885-86) of the Royal Academy.

† Josephus, Antiquities, Book xviii., chap. v.

THE PRINCE'S CLUB, KNIGHTSBRIDGE.

THE site of the old "Prince's Club," at Hans-place, Chelsea, being required for the rebuilding operations on Lord Cadogan's estate, that famous resort for the lovers of tennis and racquets has been transplanted to Knightsbridge, the aspect of which thoroughfare has greatly changed for the better during the last twenty years, what with the rebuilding of the cavalry barracks, and the enterprise of Mr. J. Charlton Humphreys, whose blocks of residential chambers and other buildings are among the most prominent features of the neighbourhood, although the existing buildings are becoming somewhat eclipsed by the lofty block now in course of erection by Messrs. J. W. Hobbs & Co., Limited, opposite Sloane-street, a block which overlooks Hyde Park on one side, and the height of which has already been reduced by the intervention of the First Commissioner of Works.

The new Prince's Club, opened the other day by the Prince of Wales, has been built on an area covering nearly two acres of ground, part of which was formerly the site of "Humphreys's Hall," where the "Japanese Village" was formed. The present entrance leads direct from the Knightsbridge-road into a hall embellished with Corinthian columns. From the hall one enters the "Oak Room," Elizabethan in character, and some 45 ft. square, having a finely-carved oak chimney-piece and a panelled oak dado running round to a height of some 10 ft., above which is hung richly-coloured tapestry. Overlooking the room is a music-gallery, from which a good view may be obtained of the coffered ceiling, designed by Mr. Donaldson. The tennis and two racquet Courts have been, as nearly as possible, copied from the courts of the old Club in Hans-place, under the superintendence of Charles Saunders, the Tennis Champion, and are stated by experts to be completely successful. The Courts are so arranged that from the Racquet Court Gallery play from all three Courts can be seen. A second Tennis Court and the Gymnasium are now being built. An exceptional feature in the Club is its Turkish Bath, which is, perhaps, the most elegant in London. This has been decorated with hand-painted and mosaic work of Pompeian character by Signor Marolda and a staff of Italian artists. There are also a number of hot and cold water baths, a Russian or vapour bath, needle, sitz, and other baths. The whole of these baths have been supplied by Mr. John Smeaton, of Great Queen-street, Lincoln's Inn-fields, who also arranged and planned the Turkish baths, which are heated and ventilated on his system. All the sanitary appliances, lavatories, water-closets, ventilation, and drainage, have also been carried out by Mr. Smeaton. There is a most luxurious plunge-bath, which is of a uniform depth of 5 ft. 2 in., and contains 7,000 gallons of water, and is inlaid with blue glass mosaic, bedded on a layer of Claridge's asphalte. The fittings of the plunge-bath are of buff brass, and the whole is stated to be from an old Roman copy. There is a well-appointed dining-room, 60 ft. square, part of which is occupied by a billiard-table. The building is lighted by electricity and ventilated on modern principles. A lease

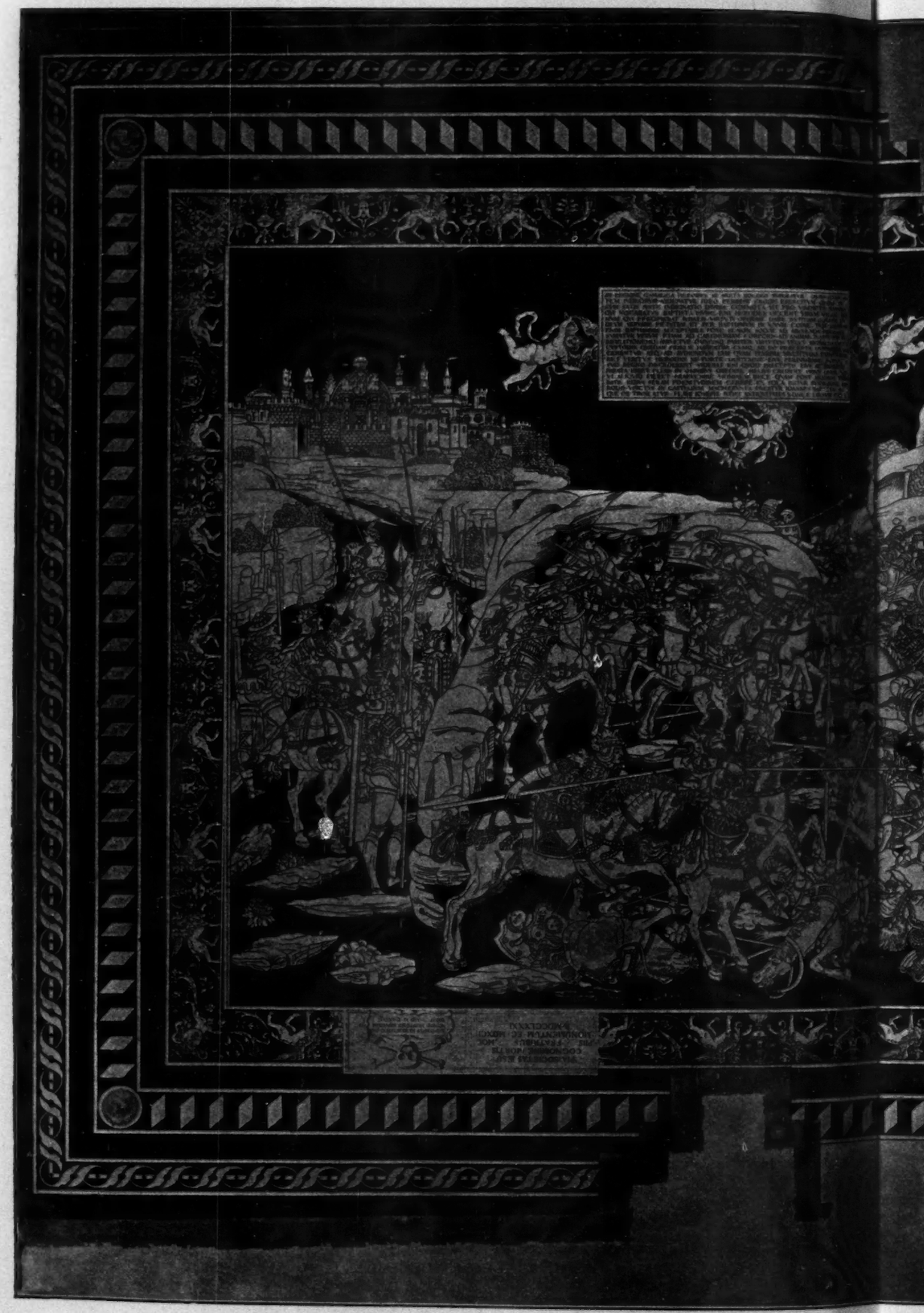
AWING BY MR. T. MAC LAREN.

PORTION OF PAVEMENT, SIENA CATHEDRAL.—Fr

4 full size

"ISA-PHOTO," OPERAGLAS 4 & 5, 66, SHAFTSBURY HOUSE, CHANCERY ST., LONDON, E.C.

From a Drawing by Mr. T. Mac Laren.



PORTION OF THE PAVEMENT, S

From a Photograph.

The Phototype Co., 303, Strand, London.

NT, SIENA CATHEDRAL.

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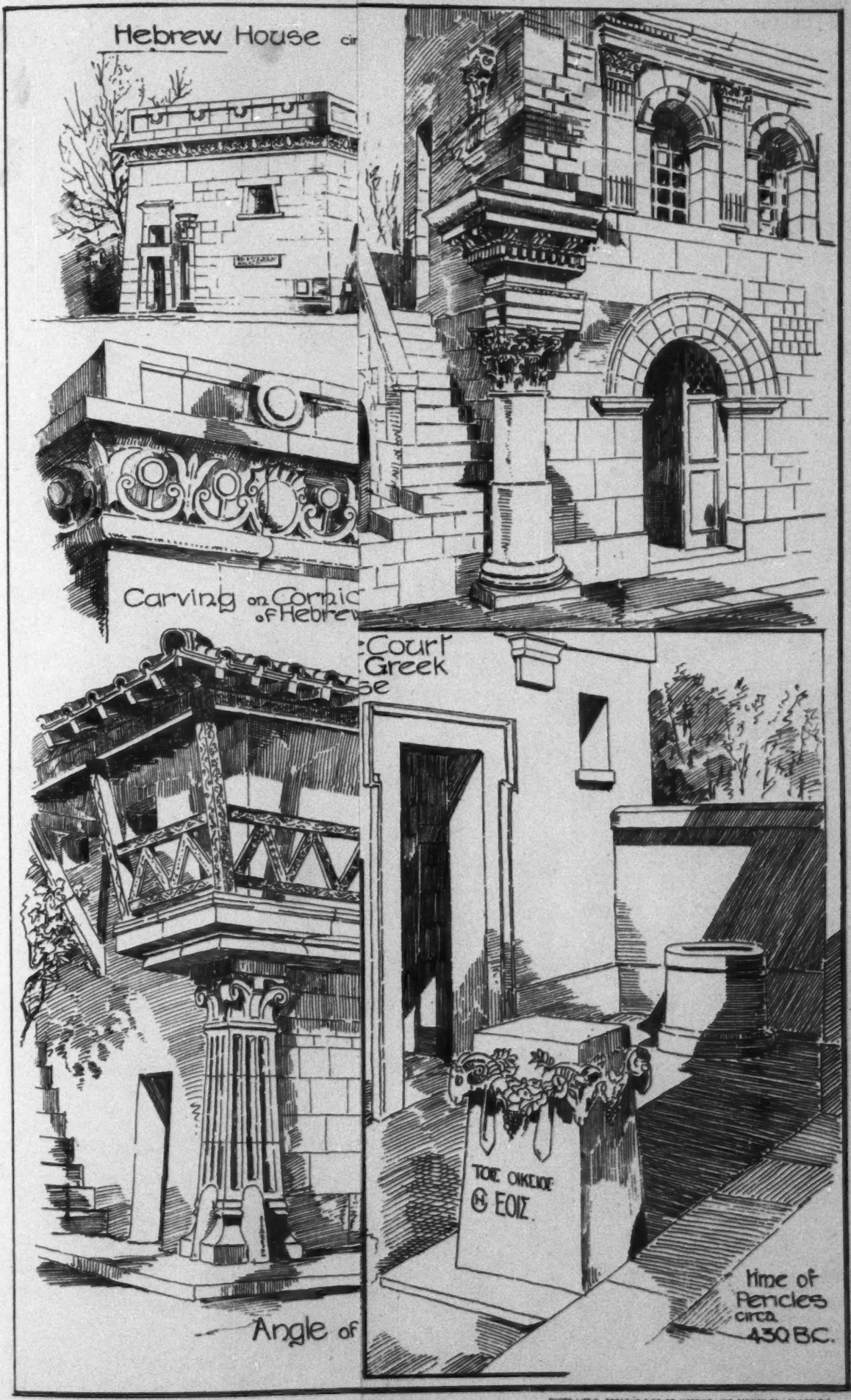
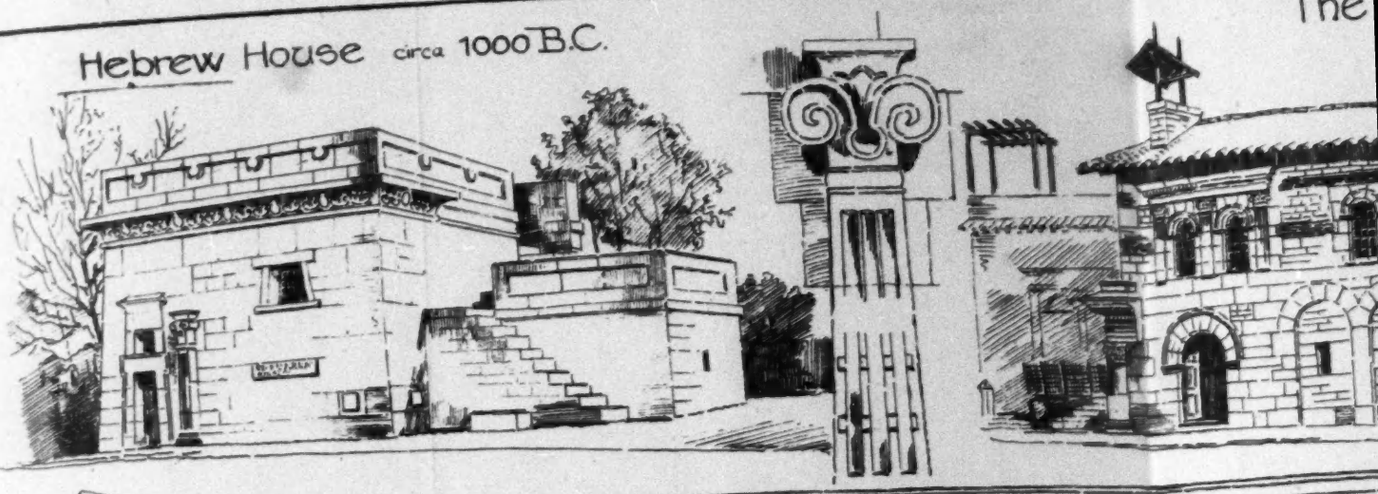


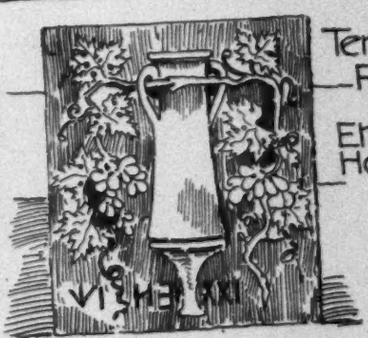
PHOTO-LITHO. SPRAGUE & Co 22, MARTINS LANE, CANNON ST. LONDON, E.C.

The Paris Exhibition

Sketches of some of the Buildings illustrating The History of Human Dwellings.

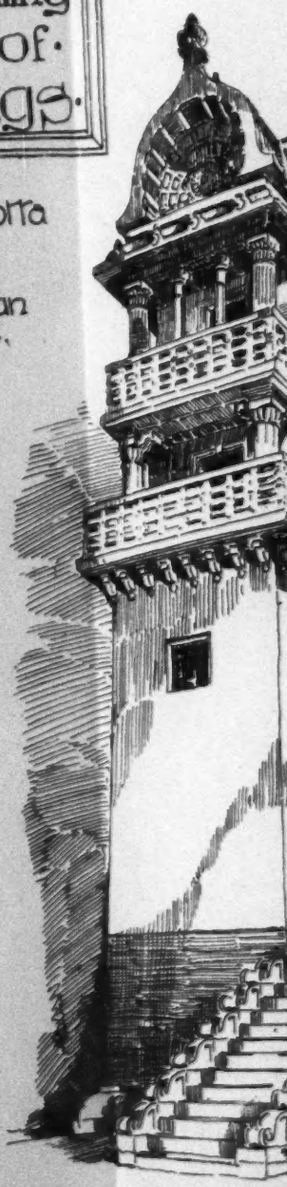


Carving on Cornice of Hebrew House.


Terra-cotta Panel from Etruscan House.

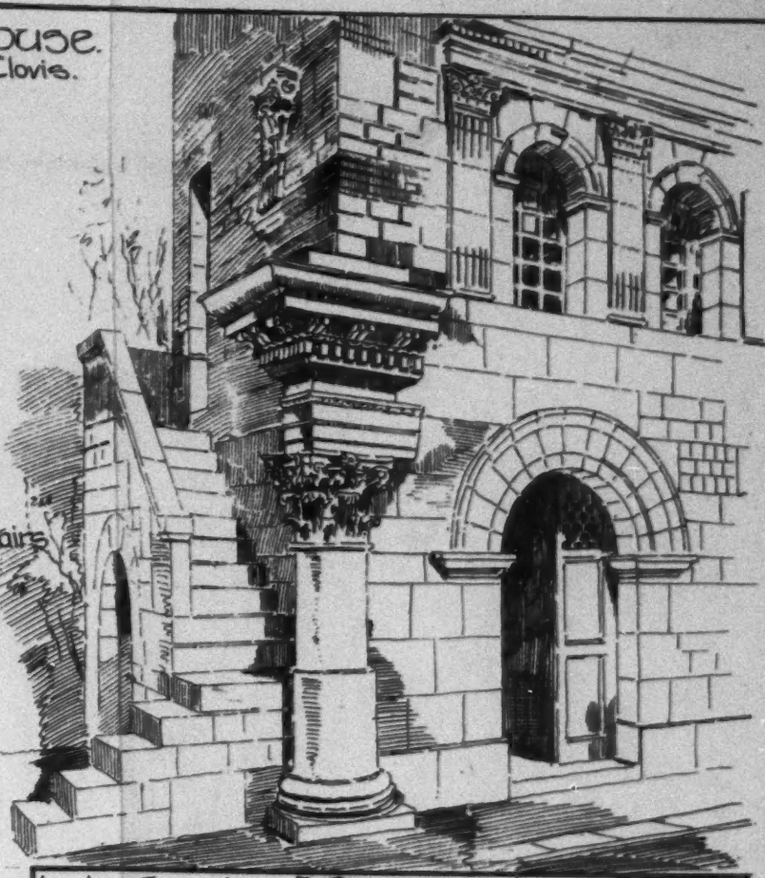
Angle of the Etruscan House circa 1000 B.C.

Cap from Etruscan House


Hindoo

The Gallo-Roman House.
Time of Clovis.

General view.



Angle shewing stairs

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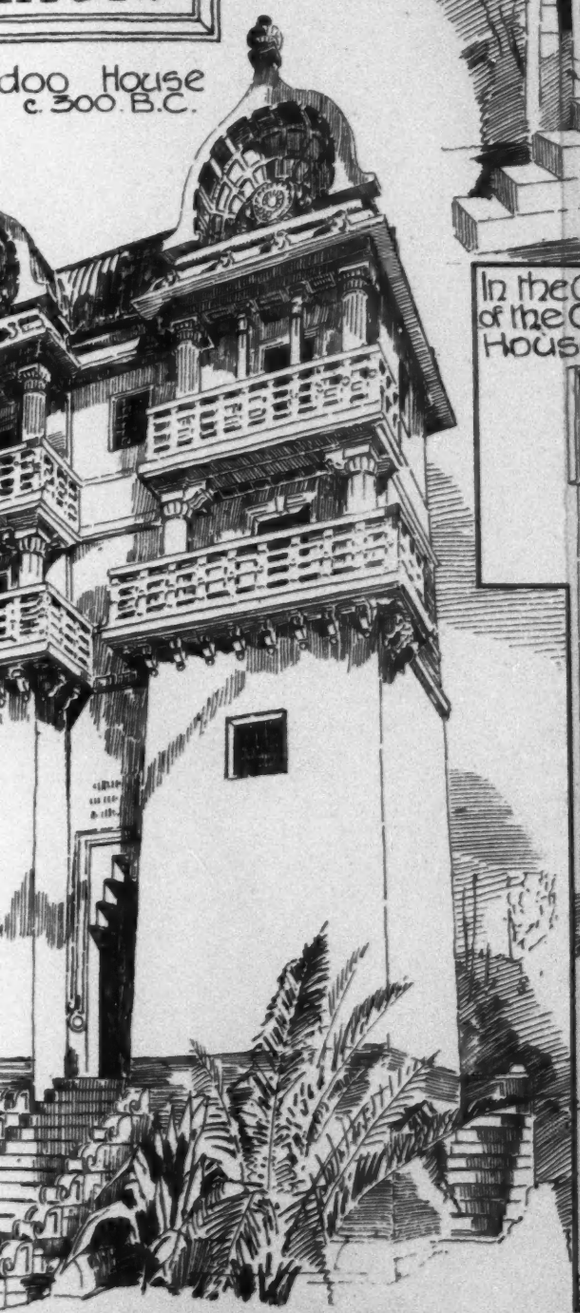
doo House
c. 300 B.C.



In the Court of the Greek House

Time of Pericles
circa
430 B.C.

PHOTO-LITHO. SPRAGUE & Co 22, MARTINS LANE, CANNON ST, LONDON, E.C.

SIENA CATHEDRAL, Marble Pavement

From "Moses striking the Rock"

PORTIONS OF PAVEMENT, SIENA CATHEDRAL.—FROM D

Gill size

"THE PHOTO" SPRAGUE &CO. 32 MARTINS LANE, CANNON ST. LONDON E.C.

—From Drawings by Mr. T. Mac Laren,

Portion of Old Tower on Ludgate Hill, now being Demolished.

of nearly eighty years has been obtained, and the number of members is over 800. The Club has been built by Messrs. Peto Bros., from the designs of the architect, Mr. E. H. Bourchier, A.R.I.B.A., and the decorations and furnishing have been directed personally by a member of the Club, Mr. George Donaldson, some of the work being done by Messrs. Campbell, Smith, & Co. The electric lighting is by the United Electric Engineering Company, under the supervision of Major-General Webber, C.B. The two racquet-courts are paved with Claridge's asphalte, the total area being 3,630 ft. super. We are informed that the originator of the re-birth of the old institution known as "Prince's," is Mr. R. Hippisley Cox, the Vice-Chairman of the Club Company.

OLD TOWER ON LUDGATE-HILL.

THE remains of the old tower shown in the accompanying illustration have been made use of *in situ* in building the block of houses now in course of demolition on the south side of Ludgate-hill, between St. Martin's-court and Pilgrim-street. Our view is taken looking westward. The tower is near Pilgrim-street, where it has been visible for a long time, but very little noticed, even by people who have passed it every day. It formed the party-wall between Messrs. Cormack's premises and the adjoining house eastwards which formerly came out to the same line of frontage. It still constitutes the party-wall with the house that has been put back (a bonnet warehouse), for the old work extends from the Ludgate-hill front to the street in the rear, a distance of about 35 ft. It is 3 ft. thick, and perhaps 30 ft. high.

As one sees it from Ludgate-hill, it will be noticed to consist of rubble masonry, with squared quoin stones at the angle, also round what has been the opening for a window in the upper part to the left, and still higher in a cornice or string-course. The structure was formerly an appendage to Ludgate, and may be considered to be more than six hundred years old, having been built, no doubt, together with a new City wall, about 1274, in the time of Edward I.

The following quotation from Lambert's "History of London" explains its origin clearly:—"In this year (1274) Robert Kilwarby, Archbishop of Canterbury, by licence from the Crown, founded the Convent of Blackfriars, which was built with the stones taken out of the ruins of the Tower of Mountfitchet, and from a part of the City wall pulled down to make way for the building. This produced an order from the King to the Citizens of London to build *a new wall with a tower at the head of it for his reception, which wall was to run from Ludgate westward behind the houses to Fleet Ditch*, and thence southward to the river Thames. For the completing of which new work his Majesty granted the City a duty on sundry merchandizes for the term of three years."

This new wall practically added to the City by enclosing a precinct about the size of an average London square, but the added area was not subject to the jurisdiction of the Lord Mayor. Part of this new wall can now be seen at the junction of Pilgrim-street and the Broadway, near which point it was connected with the Tower. Other portions of the same wall were removed about seven years ago, when Little Bridge-street was widened, but the foundations remain deep down under the north side of the same street.

Ludgate itself stood a little above the Old Bailey, and close to the west side of St. Martin's Church. In excavating the basement of Messrs. Pearce's premises (which are already rebuilding) some old stonework was uncovered, which very probably formed part of the Gate-building at a point where it joined on to King Edward's Tower.

W. S.

SANITATION AT CHELMSFORD.

THE Association of Public Sanitary Inspectors of Great Britain held their fourth annual provincial meeting on Saturday last, June 8, Chelmsford being this year the town selected for the meeting. A large party of the members left Liverpool-street Station at 9 o'clock, and their number was augmented by other members who joined the train at Stratford and other stations *en route*. Arriving at Chelmsford soon after 10 o'clock, they were cordially received by His Worship the Mayor of Chelmsford, Mr. Frederic Chancellor, F.R.I.B.A.*

At eleven o'clock a meeting was held in an upper room of the Corn Exchange. The Mayor took the chair at the commencement of the proceedings, and, in the course of his introductory remarks, welcoming the members of the Association to Chelmsford, referred to the progress in sanitation which had been made by the town during the last thirty or forty years. He said that he was glad to see, not only in Chelmsford, but everywhere else, a general awakening to the importance of good drainage and efficient sanitation in all respects. Indeed, at the present time, the man who showed carelessness or indifference as to the sanitation of his house branded himself an outer barbarian, for in these days of luxury and comfort, when baths, lavatories, water-closets, and other conveniences were brought inside our houses, it was especially needful to see that the arrangements were safe. In that work the house-holder or house-owner was largely dependent upon the technical knowledge of the sanitary inspector, who should be a highly-trained and adequately-remunerated officer,—not a mere broken-down tradesman,—and a man not afraid of doing his duty (applause). Proceeding to refer to what had been done in Chelmsford, the Mayor said that within the last few years they had established a sewage-farm, which, however much it might be criticised, was, he believed, the only sewage-farm in the country which was worked at a profit. The accumulated profits of five years' working, after paying all expenses (exclusive of rent), amounted to about 1,000*l*. Having referred to the question of water supply, and to the care taken in maintaining and keeping clean the roads and footpaths of the town, the Mayor vacated the chair, which was thereupon taken by Mr. Hugh Alexander, the Chairman of the Council of the Association.

Mr. Alexander, in the course of a short speech, referred to the growth of the Association, which now numbered about 400 members on its roll, exclusive of the membership of branch associations. In Manchester, Yorkshire, and other localities, similar but independent societies had been formed for promoting the same objects as those which the parent society had at heart.

Letters regretting the inability of the writers to attend were received from Mr. W. J. Beadel, M.P., and other local Members of Parliament, as well as from Dr. Richardson, F.R.S., Mr. E. C. Robins, F.S.A., and other gentlemen.

The Hon. Secretary (Mr. S. C. Legg) read a letter from the Town Clerk of Folkestone, inviting the Association to hold a meeting there in September next. On the motion of Mr. Stace (Limehouse), seconded by Mr. Woonton (St. George's-in-the-East), it was resolved to accept the invitation with thanks.

Several new members having been elected,

Dr. A. Downes, D.P.H.Camb., Local Government Board Inspector, and late Medical Officer of Health for the Chelmsford Union, gave an address on "Sanitation in Chelmsford." After a few prefatory remarks, he said that the population of the Urban Sanitary District of Chelmsford was, in 1881, just under 10,000 (9,885); probably at the present time it was a little over 10,000. It was not a fast-growing town. Its industries included implement works, breweries, maltings, &c. As to its geological position, the town was situate in a shallow valley just above the junction of two streams, the Cann and the Chelmer. Chelmsford proper was situate in the fork of the rivers; south of the Cann was Moulsham. The London clay, which was found over nearly the whole area of Essex, was at Chelmsford covered with from 10 ft. to 30 ft. of gravel. On the Moulsham side the gravel in its turn was capped by brick earth.

* Chelmsford, although the county town, and a place of some antiquity, has only lately been incorporated, and the citizens elected Mr. Chancellor, the well-known architect, to be their first Mayor. Mr. Chancellor had previously rendered much good service to the town as Chairman of the Local Board, which has now been superseded by the Corporation.

With regard to sanitary administration generally, perhaps the most active sanitary inspector that this country had ever known was Cholera. In consequence of its appearance, in 1849 Mr. Edward Cresy, one of the Inspectors of the then General Board of Health, made a report on the sanitary condition of the town. As one result of Mr. Cresy's report, the old Local Board of Health was formed, and that Board, which did much for the town, continued to exist until last year, when the town was incorporated. One of the first things which the Local Board set about was the improvement of the water supply of the town. In 1853-4 an artesian well was sunk in Moulsham. It went to a depth of 568 ft., including 200 ft. in the chalk. The estimated yield of that well in 1866 was 90,000 gallons daily; at present it was estimated at 80,000 gallons. A supplementary shallow well which had also been made was closed in 1866, as the water from it was condemned by Dr. Buchanan when he made his inspection that year. In 1869, the old Burgess well, which had previously supplied the town conduit, was piped to the pumping station; its yield was about 70,000 gallons. The new scheme of supply, now in progress of completion, from the Admiral's Park well, would give, it was estimated, a yield of 100,000 gallons per day, so that there would then be a total yield of about 250,000 gallons per day, or twenty-five gallons per head of the population. Proceeding to speak of the geology of the water-supply, Dr. Downes said that the county of Essex was covered almost entirely by a coating of stiff blue tenacious clay (London clay), varying in thickness from about 20 ft. at Thaxted to 80 ft. at Halstead, 126 ft. at Braintree, 200 ft. at Chelmsford, and 450 ft. at Foulness. The artesian well at Moulsham was sunk right through the London clay to the Thanet beds, whence most of the water was probably obtained, and not from the chalk. The lower tertiaries, to which the Thanet beds belonged, cropped out all round the fringe of the London clay, and the water falling on these outcrops percolated into the shallow saucer, so to speak, below the London clay, and was retained there under pressure. From the fact that the levels of the wells had fallen, and continued to fall, it was probably the case that they were pumping from an underground reservoir faster than the reservoir was supplied. It was a case of "pull baker, pull butcher,"—or, rather, of "pull brewer, pull Board," for he understood that an arrangement had been made that the brewers and the Board should not pump at the same time, or they would be pulling against each other. Analyses of the water from the Thanet beds showed it to be exceedingly soft. It contained scarcely any lime or magnesia, but there was a great deal of bicarbonate of soda and chloride of soda. It was a water which had very often been condemned as containing a great deal of free ammonia, but analysts now understood it better. The second source of water supply in Chelmsford was the drift gravel, whence the water from the Burgess well, and the water from the Admiral's Park well, was obtained. The water from that source was hard to the extent of 22 or 23 degs. of hardness, but its hardness could be reduced to 7 or 8 deg. by Clark's well-known process. In conclusion, Dr. Downes described the sewerage of Chelmsford, which was first undertaken by the Local Board in 1853. The sewage was at first pumped into the river, where it speedily became a nuisance. After some five years of this, filter tanks were constructed, the effluent being pumped into the river, and the solids being sold. The passing of the effluent into the river soon caused another nuisance, and about 1866 the sewage was pumped on to Barnes Farm, the lease of which expired in 1880, when the present Joint Sewage Farm, to which the sewage was conveyed by gravitation, was laid out. The carrying out of these works, and of paving, scavenging, and other auxiliaries, had done a great deal for the health of Chelmsford, and great credit was due to Mr. Pertwee, the Borough Surveyor, who had served the town most conscientiously and ably for about a quarter of a century, and to the Mayor,—to whose zeal and energy for the good of the town was due all the best work of the last ten or fifteen years (applause). But owing to the presence of a mill-dam on the river, the subsoil water of the town was 5 ft. or 6 ft. nearer the surface of the ground than it ought to be, and that was a very serious thing for the health of the town. Sir Douglas Galton was of opinion that it was desirable to have at least 15 ft. of dry subsoil under dwellings, but they had nothing like that in Chelmsford.

Dr. Tripe, in moving a vote of thanks to Dr. Downes for his interesting address, said that the town would do well to acquire the mill as speedily as possible, and to remove the mill-dam referred to, for by lowering the level of the subsoil water they would have less consumption, and generally less *malaise*, to contend with.

Alderman Duffield, in seconding the motion, humorously referred to the fact that the pecuniary success of the sewage farm was due to the fact that the produce grown was used in fattening calves.

Dr. Alfred Carpenter, J.P., Croydon, in a long speech moved the following resolution:—

"That this meeting desires to record its opinion that, in order to secure proper sanitary inspection, it is desirable that only properly qualified men should be appointed to the position of Sanitary Inspectors; and that such officers should be adequately remunerated and protected in the discharge of their duty, and not be discharged, nor their salaries diminished, without the sanction of the Local Government Board. The meeting also desires to express the opinion that all Sanitary Inspectors should be required by law periodically to inspect the district to which they are appointed, in order to detect the existence of nuisances, and in such cases to serve notices for the abatement of such nuisances,—which notices should be read at the next meeting of the Board or Committee appointed for such purpose, and, if approved, such notices should be valid, and proceedings taken thereon as occasion may require."

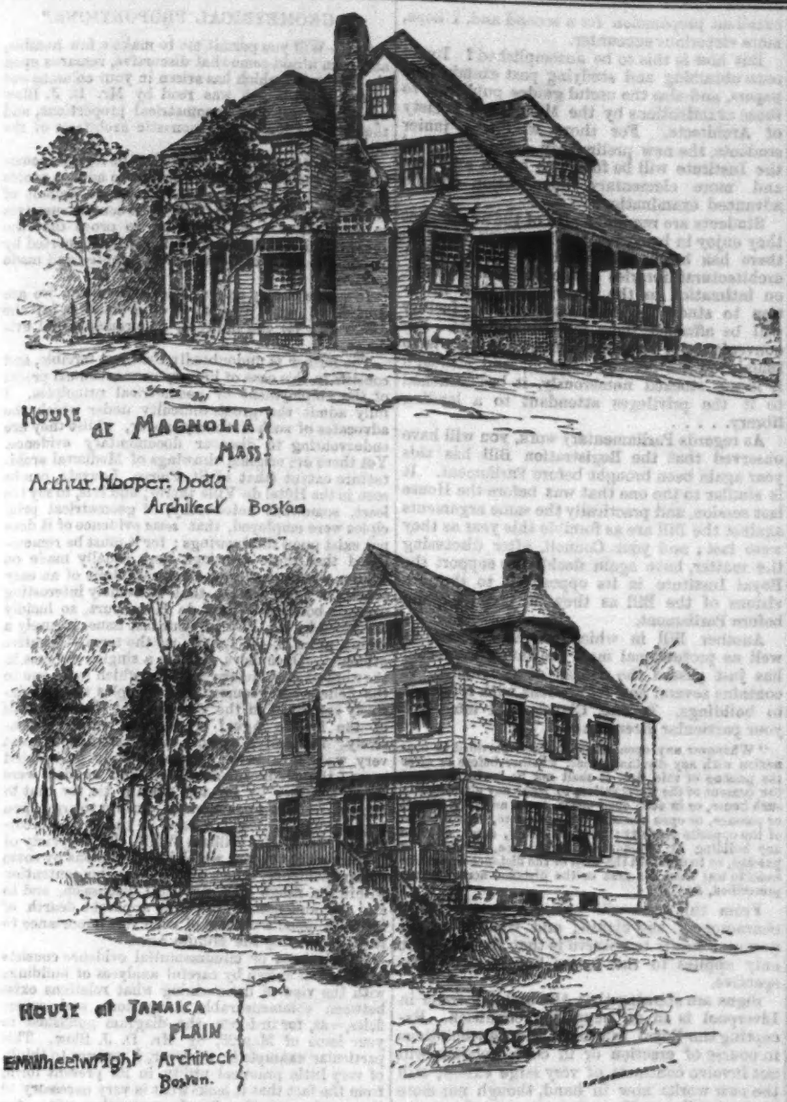
Mr. E. Lewis Thomas, M.A., hon. counsel to the Association, seconded the motion, and adduced arguments which strongly showed the necessity of protecting sanitary inspectors from being intimidated against the fearless and thorough discharge of their duties.

Dr. Major Greenwood, Dr. Tripe, and Mr. Woonton having spoken, the resolution was unanimously agreed to, and the Secretary was instructed to send a copy of it to the Local Government Board.

Votes of thanks having been passed to the Mayor, and to Mr. Alexander, the visitors adjourned to the Corn Exchange, where they were entertained at luncheon by the Mayor. After luncheon they drove to the new Union Buildings, now in course of erection. They are planned in detached blocks, on the pavilion principle, and the material used externally is red brick. The buildings are to replace those burnt down some time back. The architect (His Worship the Mayor) explained the sanitary arrangements, which are of a very complete character, the drains being laid outside the buildings in straight lines, with inspection manholes at frequent intervals. All soil, waste, and lavatory pipes are tapped and disconnected. The builders are Messrs. Longley & Co., of Crawley, Sussex, Mr. A. W. Mitchell being clerk of the works.

The party then visited the Baddow Water Tower, where Mr. C. Pertwee, the Borough Engineer, read the following short paper on the water supply and drainage scheme carried out by the Chelmsford Rural Sanitary Authority:—

"The Water Tower consists of a brick tower 25 ft. square, 70 ft. in height, surmounted with a cast-iron tank of the capacity of 40,000 gallons. The tower is situate on the Baddow-road, about midway between the portions of Springfield and Great Baddow to be supplied with water, and at a level of 100·0 on Ordnance Survey, the highest ground to be supplied being at 141·0. The water is obtained from a surface spring just below the base of the tower, yielding about 90,000 gallons per diem, and is raised to the tank above by one of Crossley Bros.' 8 h.-p. gas-engines, with 8 in. duplex ram-



pumps, delivering 8,000 gallons per hour, when at work. The population supplied is about 2,500; the water is constantly on, and a quantity of from 35,000 to 40,000 gallons is daily pumped. Gas being charged at 4s. 6d. per 1,000 cubic feet, the cost of raising the water to the tank is at the rate of about 1¼d. per 1,000 gallons. The water is distributed throughout the districts of Springfield and Great Baddow by means of 6 in., 5 in., 4 in., and 3 in. mains, coated with black varnish.

The drainage of the districts referred to is by means of stoneware pipe sewers connected with the main outfall sewer, conveying also the drainage of the Chelmsford Borough along the valley line of the Chelmer and Blackwater Canal to the Sewage Farm at Brook End, Springfield. In addition to the ventilators, some sixteen or eighteen automatic flushing-chambers are in constant use, for the purpose of cleansing and freeing the sewers from gas and impurities.

The cost of the purchase of site, spring, erection of tower, engine, and pumps, was about 3,500*l.*; and of the water mains, 2,800*l.*; the expenditure upon the system of drainage, apart from the outfall sewer, was about 5,400*l.* The works have been in operation since 1882, and the cost of repairs has been almost *nil*, or very trifling indeed."

The visitors next proceeded to the Sewage Farm, where Mr. Pertwee read the following paper:—

"The town was sewered in the year 1852. The sewers consist of 15 in., 12 in., 9 in., and 6 in. glazed stoneware pipes, laid so as to empty into the back-water of Moulsham Mill, skirting King's Head Mead, at a level of 71·5 on the Ordnance Survey. The discharge having become a nuisance, a sewer was constructed to convey the sewage to the pumping station in Mildmay-road, and at the same time a barrel-drain 2 ft. 3 in. by 2 ft., about ¾ mile in length, was made, acting as a storm relief and elongated reservoir during night when the pumping ceased. This sewer communicated with the Chelmer and Blackwater Navigation just below the first lock. A piece of land was purchased, and settling-tanks constructed, into which the sewage was for some time pumped, the effluent reaching the Navigation, and the sludge, mixed with scavengers' rubbish, sold for agricultural use. This process having in time also become a nuisance, the sewage was leased in 1865 to Mr. F. Marriage, for fourteen years, at 30*l.* per annum, the Local Board laying the mains and pumping the sewage on to Barnes Farm, Springfield, where the lessee dealt with it by irrigation on arable and pasture lands. In 1880 the Rural Sanitary Authority being desirous of draining the adjoining villages of Springfield, Great Baddow, and Widford, a joint scheme was agreed upon between the Urban and Rural Authorities for one common outfall sewer along the valley line, so as to receive by gravitation the whole of the tributary sewers throughout from a combined population of about 13,500. A farm comprising 108 acres was purchased at Brook End, Springfield, where receiving-tanks, distributing-carriers, and under-drains were constructed, and the land prepared for sewage irrigation. The main sewer, which is egg-shaped, 30 in. by 20 in., is 3,000 yards in length, has a gradient of 1 in 1,200, or about 4 ft. to a mile, with a velocity of 1·40 ft. per second, and an average daily discharge of about 300,000 gallons. At the terminus of the main sewer (the level being 69·60), screening-tanks in duplicate are constructed for the purpose of keeping back solid and flocculent matter, the sewage being conveyed to various portions of the land through underground stoneware pipe carriers, with manhole-chambers and sluices for distributing the sewage to the surface land carriers whenever desired. About 9 acres of arable land adjoining the tanks were laid out into ten beds, and deeply drained two rods apart to receive the sewage by intermittent filtration, the remainder of the farm being generally levelled and laid out for irrigation in the usual way, for the cultivation of rye-grass, market-garden produce, osiers, and cereals. The total cost of the scheme, purchase of land, compensations, and preparation works, including the erection of a new covered farm-stead, has been about £28,000, which amount was borrowed for a period of fifty years, and is being repaid by the two Authorities in proportion to their respective populations, the Corporation contributing eight-elevenths and the Rural Authority three-elevenths, as per agreement. The scheme has been in operation now since Michaelmas, 1882, a period of upwards of seven years, with the result that the town and neighbourhood have been relieved of all nuisance, and the farm has, in addition to paying working expenses, rates, tithes, and taxes, accumulated a sum of £1,000, a portion of which is used as working capital, and the balance carried to the credit of the rates."

Mr. Alderman Durrant, chairman of the Joint Sewage Committee, made some remarks about the work at the farm, as did Dr. Alfred Carpenter, who strongly urged that the sewage ought to go upon the land while still fresh. That this was not so at Chelmsford on Saturday last was disagreeably evident to some of the visitors.

There was no time to visit the new water-works, but the following particulars of them, furnished by Mr. Pertwee, may be given here,—

"The inadequacy of the present water-supply of the borough has been long felt, and to meet the demand, after careful consideration of various other schemes, the works now in operation were determined upon. The present water-supply consists of about 60,000 gals., derived from an artesian well, and of about 70,000 gals. obtained from a surface spring known as the Burgess Well, thus giving 130,000 gals. per diem for a population of about 9,000. The water is either pumped direct into the mains, or into an underground reservoir situate at the top of Wood-street, on the southern side of, and about 150 ft. above, the main portion of the town. The district is divided into three areas, and the water is distributed in each for about four hours every day upon the intermittent system. Most of the mains and services have been in use upwards of thirty years, and, being more or less defective, the leakage and waste is very considerable indeed. The proposed supplemental scheme provides for the renewal of the present mains and services generally, in connexion, of course, with additional mains, and comprises the acquisition of a powerful spring cropping out at Admiral's Park, on the north-western side of the parish. This spring is collected into a covered reservoir of the capacity of 175,000 gals., from which a 9 in. suction will be led to the pumps. The tower, which is 36 ft. square, is situate upon ground at a level of 11·2.0 (Ordnance Survey levels), and is carried up 70 ft. in height to receive a cast-iron tank to receive 80,000 gals. of water. The lower portions of the tower are arranged for the engine and pumps and engineer's house, the next floor being for engineers' workshop and as bedrooms. The engine-room will be fitted with Crossley Bros.' 12 h.p. gas engine, with 7½ diam. three-throw ram pumps, having 15 in. stroke, so as to raise 20,000 gals. per hour into the tank above. The water will be distributed throughout the district by means of the mains already referred to; and it is intended to keep up a constant service, a total supply of about twenty-eight gallons per head of the population being at command. The estimated cost of the works is as under, viz., purchase of spring, construction of reservoir, tower, tank engine and pumps, about 6,500*l.*; and that of the mains, hydrants, valves, &c., 3,500*l.*"

The majority of the visitors returned to town in the evening.

A GROUP OF COUNTRY HOUSES NEAR BOSTON, MASSACHUSETTS, U.S.A.

THE four houses here illustrated are given as examples of the modern picturesque country house on a small scale, in the treatment of which, in a simple but effective manner, modern American architects have been often very successful.

THE LIVERPOOL ARCHITECTURAL SOCIETY.

MR. EDMUND KIRBY, President of the Liverpool Architectural Society, in his address recently delivered at the annual general meeting of that Society said:—

Last year, in addressing myself to the members of our Society, I strongly urged upon their serious attention the desirability of affiliating the Liverpool Architectural Society with the Royal Institute of British Architects. At our general meeting, held last month, a resolution embodying this scheme was carried unanimously, and later on our Secretary received from the Institute the pleasant notification of the adoption of our affiliation. Apart from the reasons already given as to the advantages of this step, practical ones have arisen which must at once appeal to us as important gains to our Society.

Directly the affiliation took place, the Council of the Institute acted promptly in showing its recognition of our relationship by nominating your president to be on its Council, and two members of the Liverpool Architectural Society to serve on two important committees of the Royal Institute.

I mention these facts, as they clearly point out to us that this affiliation has already become not merely a name, but a reality, in the endeavour to give us, besides a share in the advantages of union, a voice and a vote in the central government. I have not a doubt but this beginning will go on developing still further, bringing us in closer touch not only with our brethren in London, but with the profession generally throughout the Empire.

Our own Society has just revised its rules, and after their close discussion at two special meetings, they have been adopted as now printed. I am sure all the changes which have been made have been introduced for the benefit and well-being of the Society; and I am certain that although, naturally, some may have objections to one or two of the alterations, still, we all, as friends of the common weal, will do our best to carry out these new rules in their full integrity.

It will not be out of place here to mention the obligation which the Society is under to its honorary solicitor, Mr. Richard Cleaver, for the help, skill, and attention he has so kindly given in guiding through, in a clear, business-like manner, the various stages of framing these new rules which have lately come into operation.

Any review of the past session would be incomplete without reference to the Art Congress held in Liverpool during the autumn of last year. Amongst the subjects lectured upon in relation to art, papers of much architectural interest were delivered by Messrs. G. Aitchison, A.R.A., T. G. Jackson, H. H. Statham, H. Sumners, E. Warren, &c., evoking interesting and animated discussions,—and for full accounts of which I was about to refer you to the official report of the Congress, but although it was understood that copies of the proceedings were going to be issued shortly after the completion of the Congress, I am surprised to find that up to this period no sign of their being published has yet come within anybody's knowledge.

Early this year, under the auspices of the Royal Institute of British Architects, the Examination in Architecture took place at the Royal Institution in this town, and gentlemen came from various parts of the country and from Ireland to present themselves for the examination.

I must congratulate the Society on possessing amongst its member gentlemen who, although very much engaged with their ordinary business duties, cheerfully undertook to devote their experience, knowledge, and time to conduct the examination of the younger members of the profession. Foremost amongst those who served on the Board of Examiners, their secretary, Mr. Culshaw, must again be thanked for the thorough and efficient manner in which he carried out the administration of an onerous and sometimes thankless office. I say he again must be thanked, for a little while since the Institute recognised in a vote of thanks their appreciation of Mr. Culshaw's services.

There can be no doubt that these examinations are of the greatest importance to the youth of the profession, and, if my words carried weight, I should strongly advise our younger members to make up their minds to immediately prepare themselves for an attack on the next examination papers, which, if at first not successfully overcome, will form an excellent preparation for a second and, I hope, more victorious encounter.

But how is this to be accomplished? By at once obtaining and studying past examination papers, and also the useful guides published to these examinations by the Manchester Society of Architects. For those who are junior students, the new preliminary examinations of the Institute will be found to be an excellent and more elementary introduction to the advanced examination.

Students are reminded also of the advantages they enjoy in being located in a town in which there has been established one of the finest architectural libraries in the world, and where, on intimation to the librarian of their intention to study for examination, every facility will be afforded them for that purpose. For convenience of reference, our own library is to remain in its present position, and although it is not stocked numerously, it has attached to it the privileges attendant to a lending library. . . . .

As regards Parliamentary work, you will have observed that the Registration Bill has this year again been brought before Parliament. It is similar to the one that was before the House last session, and practically the same arguments against the Bill are as forcible this year as they were last; and your Council, after discussing the matter, have again decided to support the Royal Institute in its opposition to the provisions of the Bill as they at present stand before Parliament.

Another Bill in which we as citizens, as well as professional men, are much interested has just passed the House of Commons. It contains several new regulations with reference to buildings. To one, Clause 41, I must call your particular attention:—

"Whenever any open space has been provided in connexion with any dwelling-house, whether before or after the passing of this Act, it shall not be lawful, without the consent of the Corporation, to make any alteration in such house, or in such open space, or in any back street, or passage, or open space adjoining thereto, or in the line of the opposite property: or to construct, erect, or raise any building or structure on such space, or street, or passage, or to diminish the area or the distance across the same to less than the area or the distance across herein prescribed, &c."

From this you will perceive the sweeping character of the clause; and what is of importance for us to observe is that its force not only applies to the future but is also retrospective.

Signs are showing that the building trade in Liverpool is in an improving condition. Excepting the Royal Infirmary, the new buildings in course of erection or in contemplation will not involve contracts of very large extent, still the new works now in hand, though not more than of ordinary dimensions, form in the aggregate an amount of work which will cause a considerable expenditure of money throughout the community.

On purely professional matters, I should have wished to have introduced the question of the increased responsibilities of valuers, and of the present state of the fees which cover that responsibility, but time will merely allow me to point to this as a hint which had better be thrown out for the future deliberations of the Council.

St. Andrew's Hall, Glasgow.—The past brief career of St. Andrew's Halls, Glasgow, has been a very discouraging one financially. The pile, which stands about midway between the Royal Exchange and the site of last year's Exhibition, covers an area of 5,792 square yards, and consists of grand hall, ballroom suite, and numerous smaller halls. At present St. Andrew's grand hall is the only available place for a large political or other meeting within the city. Unfortunately, however, the building has never paid its expenses, and the proprietary (a syndicate of Glasgow gentlemen formed sixteen years ago from semi-philanthropical motives), tired of their annually-recurring deficit of 500*l.* or thereabouts, have just decided to throw the building on the property market. It is stated that two years ago St. Andrew's Halls were offered to the Corporation privately for less than half the sunken capital,—the gross outlay slightly exceeded 100,000*l.*,—but, probably owing to the cost of Municipal Buildings, no motion at all was made towards closing with that offer. Final announcement of open sale was made a few days ago, and the fate of the structure, in which the citizens are now at the eleventh hour taking some rather anxious interest, is bound to be pronounced one way or other very soon.

"GEOMETRICAL PROPORTIONS."

SIR,—Will you permit me to make a few humble, and I am afraid somewhat discursive, remarks upon the discussion which has arisen in your columns out of the paper which was read by Mr. D. J. Blow upon this question of geometrical proportions, and their application by the monastic architects of the Middle Ages?

I am quite with you, Sir, as to the logical incumbency of the advocates of a theory to adduce proofs in support of their contention; and in default of these, we are necessarily obliged to confine ourselves to generalities in endeavouring to prove that the theories advanced are not sufficiently supported by arguments and facts to be safely adopted and made our own.

In such a theory as that under discussion we are confronted with two sorts of evidence: (*a*) the direct and (*b*) the indirect, or circumstantial evidence.

The former is undoubtedly the most forcible, and consists in this case of literary or mechanical proofs of the employment of geometrical principles. I fully admit the great difficulty under which the advocates of such a theory labour, whilst they are endeavouring to discover documentary evidence. Yet there *are* original drawings of Mediæval architecture extant (that of St. Pierre, Louvain, can be seen in the Hôtel de Ville there); and it is, to say the least, somewhat noteworthy, if geometrical principles were employed, that *some* evidence of it does not exist upon the drawings; for it must be remembered that these drawings were usually made on vellum, a substance that does not admit of an easy erasure. Then, again, that extremely interesting drawing-book of Wilars de Honecourt, so lucidly described by Mr. Pite in your last issue, is surely a strong piece of,—if I may use the term,—negative evidence. Once more, is there a single reference in the work of any Mediæval writer which leads one to the belief that geometrical principles were extensively employed in the designing of the cathedrals of the Middle Ages? I use the word "extensively" advisedly, because the system could not very well have been adopted simply in isolated cases; the Mediæval architects and builders were bound together by far too close a tie for that to happen. I would courteously venture to urge upon a gentleman so deeply versed in the lore of Mediævalism as is Mr. William White, the propriety of supporting the theory which he champions by some literary evidence, if he wishes to bring his contention within the range of a practical discussion, and to also try and account for the apparent dearth of tradition upon a subject of such vast importance to the world during the Middle Ages.

The indirect or circumstantial evidence consists of the result shown by careful analyses of buildings with the view of determining what relations exist between commensurable dimensions and superficies,—as, for instance, the diagram published in your issue of May 25, by Mr. D. J. Blow. This particular example is, however, I venture to think, of very little practical utility in its present form, from the fact that it lacks what is very necessary to the proving of Mr. Blow's contention, viz.,—the exact measurements of the various dimensions which he uses in his diagram. I would ask the Travelling Student to be kind enough to furnish us with these, so that we may be enabled to judge whether the different lengths, breadths, and heights are absolutely, or only approximately, correct. If these are satisfactory, and if the extension to the remainder of the cathedral of the ordeal to which Mr. Blow has subjected the choir, prove to be equally satisfactory, I, for one, shall be prepared to admit that geometrical principles were employed in the designing, *not* of Gothic architecture, but of Beauvais Cathedral.

Meanwhile, Sir, I think I am justified in holding to my opinion that the reduction of the art of architectural composition to the level of a mathematical problem is not only utterly subversive of the true principles of design, but also quite unwarranted by historical evidence, and founded, as the logicians would say, upon altogether insufficient premisses.

OWEN FLEMING.

London, June 8.

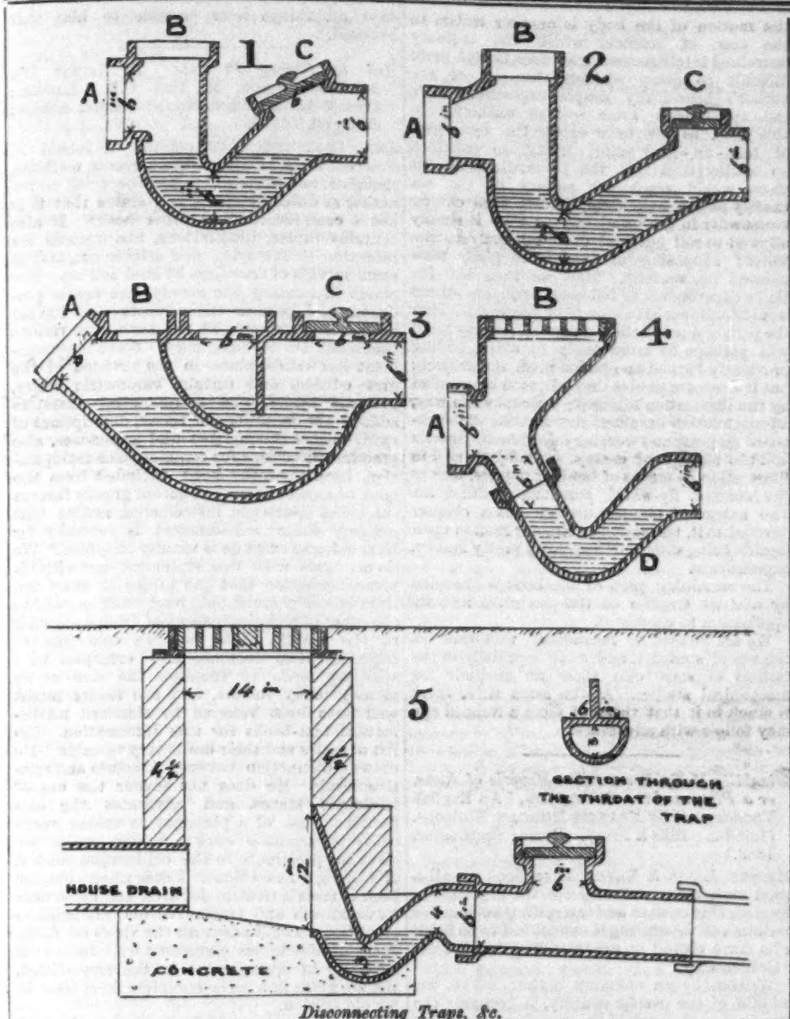
ROYAL ACADEMY STUDENTS' CLUB.

SIR,—Will you permit me, through your columns, to call the attention of past and present Academy students to this Club, which is in course of formation?

A provisional committee has been elected, and circulars are being sent out to all students, but the difficulty of obtaining accurate addresses after the lapse of several years is very great, and we therefore hope that any students who have not been communicated with will apply at once to the undersigned.

About forty Academicians and Associates have already promised to become members, and it is hoped that at least 400 students will apply for membership before the general meeting of subscribers, which is to be held at the end of this month. ROBERT S. LOVELL, Hon. Sec.

R.A. Schools, Burlington House, W.,
June 12.



Disconnecting Traps, &c.

The Student's Column.

TOWN DRAINAGE.

XXIV.—SPECIAL TRAPS: "DISCONNECTING" AND OTHERS.

THERE are different forms of traps for disconnecting the air of sewers from that of house-drains, and for other purposes. We have before shown a few conventional forms; those annexed are improvements in details. It is important to have these details of the best form; they cost no more, and are more satisfactory, working efficiently without attention. Some of these, however, are better than others in this respect. A few remarks will be sufficient to indicate the qualities of those shown in the figures 1 to 5.

No. 1 is Doulton & Co.'s "Improved Sewer-gas Interceptor." The inlet socket A, as drawn, is intended to receive a drain-pipe, 6 in. internal diameter, the air inlet B being of the same diameter. It should be larger, and the manufacturers can easily make it so. In this case, it should be enlarged to 12 in., or at least to 9 in. diameter in the clear. The air-outlet C is 6 in. diameter, as it ought to be, for a 6 in. drain. It is closed with an earthenware stopper, put in with common mortar, not cement, so that when it is necessary to remove it, that can be done without breaking the socket of the pipe, as common mortar does not set hard in damp ground, while it keeps the stopper sufficiently air-tight as long as it is required to remain there.

No. 2 is Mr. W. P. Buchan's "Patent Trap," made by Messrs. J. and W. Craig. It has a drop of 3 in. from the bottom of the pipe to the surface of the water in the trap. Its air inlet is only 6 in. diameter, same as Doulton's, but the makers are willing to enlarge it. The outlet C is 4 in. diameter. This, perhaps, also may be without objection made 6 in. for a 6 in. drain.

No. 3 is Messrs. Jas. Stiff & Sons "Registered Intercepting Sewer-air Trap." It receives the drain-pipe obliquely, at an angle of about 45 degs., by the inlet A, a curved midfeather directing the current towards the outlet when the rush of water is sufficient to reach it with any force. As drawn, its air-inlet is only 4 in. diameter,—too small. The middle inlet, 6 in. diameter, is for surface-water or house-waste. The air outlet is 6 in. diameter for a 6 in. drain.

No. 4 is Mr. S. S. Hellyer's "Ventilating Drain Syphon and Sewer Interceptor." Its air inlet is of considerable dimensions in one direction,—that shown in the section,—but crosswise it is reduced to the width of the pipe. The trap in the part marked D is of smaller size than the drain itself, being for a 6 in. drain about 4 in. diameter, thus preventing any sediment forming in the trap, and also ensuring that the water in the trap be wholly renewed more frequently than it is in traps which are of the same size in the throat as elsewhere. There is a vertical drop of 6 in. from the bottom of the drain to the level of the water in the trap.

No. 5 is Messrs. William Ingham & Sons' quick-motion trap. Its obstruction to the flow of sewage through it is less than it is in other traps,—inasmuch as there is no unnecessary and useless sinking of the sides of the orifice below the water-level. The top of the trap, crosswise, is straight and horizontal, parallel with the surface of the water in the trap. Its dip is, therefore, fully effective the whole width of the drain-pipe, and not, as is the case in all-round sections, effective only at one central point while both sides dip uselessly into the water and offer unnecessary obstruction to the flow of sewage. The reports of the experience of the use of these traps are all favourable, and when we examine the principles on which they are constructed there appears every reason why that should be so. The trap effectually bars the passage of air; its dip is the same as that of other traps, about 2 in., or 2½ in., and this is effectively disposed; while the bottom of the trap is not sunk more than 5 or 5½ in. below the bottom of the drain, instead of 8 in. or 8½ in. The body of water in the trap being small, is wholly renewed frequently. The outlet is on the next adjoining pipe, not on the trap itself. This may likewise be so with the trap No. 4, although not shown in the figure. It is one of the points of this trap that when the sewage leaves it, it falls immediately and freely over the lip into the pipe and acquires motion thereby to start with, and a free outlet in the trap is maintained.

A trap which is found very useful in situations liable to back water from the sewer, as in deep cellars, is Mr. Jennings's "Combined Yard and Tidal Trap," which has an india-rubber ball, letting sewage pass outwards, but closing against back pressure.

Books.

Experimental Mechanics. A Course of Lectures delivered at the Royal College of Science for Ireland. By SIR ROBERT STAWELL BALL, LL.D., F.R.S., Astronomer-Royal of Ireland, &c. London and New York: Macmillan & Co.

THIS is an admirable work, the subjects well chosen, the matter sound, and the style pleasant,—excellences that might be expected from the genial and accomplished Irish Astronomer-Royal. The book owes its birth to a course of lectures which Sir Robert Ball delivered in Dublin a few years ago to an evening class. The lectures were illustrated by apparatus, and a leading feature in the work under notice is the series of engravings illustrating the "properties" with which the author pointed his moral and adorned his tale. We may remark, in passing, that the same lines have been followed as those upon which Professor Willis has planned his system of apparatus designed for like purposes.

The book opens appropriately with a chapter on "The Composition of Forces." The first apparatus illustrated consists of two balls, attached one to each end of a cord, the bight of which is passed over a couple of pulleys. As the balls are of equal weight, this arrangement demonstrates an equilibrium of two forces. The equilibrium of three forces is explained by means of two equal weights arranged and suspended in the same way, but having another weight, representing the third force, attached by a second cord to the bight of the first cord. The apparatus is arranged in such a way that a black-board or slate can be placed at the back of the strings, which may therefore coincide with a diagram illustrating the theory of the composition of these forces. Nothing could be better devised than this method of impressing upon the beginner the relation between a geometrical diagram and the actual physical condition of the fact it illustrates. Were such methods more often followed, graphic presentation, which is so delightfully simple when the mind is once accustomed to its use, would be far oftener employed than it is at present. Many practical examples are also given by which the reader is familiarised with these elementary principles. The second chapter is on the resolution of forces, the action of the wind upon the sails of a vessel affording a striking and familiar illustration. A chapter on parallel forces follows, and we then get to the section which treats of the force of gravity. The familiar illustrations and parallels by which the various phenomena are described are given with a clearness and simplicity that is characteristic of the whole work, and will cause quite a new light to be thrown upon many familiar facts to which the student would probably never have attached sufficient importance, from the very fact of their familiarity. The determination of the centre of gravity of a mass, and the descriptions of stable, unstable, and neutral equilibrium, are good examples. A phenomenon that will be of especial interest to those who have ever been engaged in the designing of high-speed engines is presented by means of an apparatus causing a heavy disc to revolve with greater or less rapidity. The centre of gravity of the disc can be altered, and the vibration set up when the centres of gravity and rotation do not coincide, is emphasised by the ringing of a bell. We have noticed lately the same principle made use of by some engineering firms for regulating wood-working machinery

designed for running at high speeds, or turning machinery, such as that for milling plants, where extreme accuracy in all parts is imperative. A somewhat similar device has recently been taken advantage of for balancing car-wheels, to the great comfort of those railway passengers whose nerves may be as sensitive to vibration as the little bell in Dr. Ball's apparatus. It is such examples as this which show how much the industrial arts may owe to scientific speculation, and how the old rule-of-thumb era must pass away before the more enlightened procedure of the happily dawning age of trained intelligence.

The "Force of Friction" is treated of in Lecture V. This most important and often most disturbing factor in the determination of machine design has become more manageable lately in consequence of the labours of the Research Committee on friction appointed by the Council of the Institution of Mechanical Engineers. Of course, Sir R. Ball, who only deals in this book with first principles, does not touch on the details brought forward by the committee, but the underlying facts are better worth studying now that we have a superstructure of application which we can rear upon them. For this reason we specially recommend the chapter under consideration to the attention of engineer-students. We are glad to notice the author exposes the popular fallacy that the co-efficient of friction always equals the tangent of the angle of friction,—a most pernicious heresy, as the student may at times find, if he attempt to apply it to practical work.

A long chapter on ordinary pulleys, differential and epicycloidal pulleys, follows; in the course of which are given the results of some useful experiments as to the power required to work such devices. The lever is next attacked. Levers of the three orders are described, and simple illustrations given; the connection between the principles laid down in this connection and those bearing on parallel forces, previously dealt with, is brought out in an instructive manner. This practice of combining information, or, as it were, clinching, the instruction previously given by fresh examples, is extremely valuable, and adds greatly to the permanent value the student is likely to gain from the book, as well as increasing his interest in the work.

The inclined plane, which includes the screw, is the next subject, and after this, practical examples of the principles laid down are considered. Amongst these are the screw-jack, wheel and axle, wheel and pinion, differential pulley, crane, &c.

We now pass to a fresh section of the work, in which the fundamental laws already dealt with are combined and worked out in more complex forms. The mechanical properties of timber first receive attention, and illustrations are given by means of which the facts are explained. This brings the author to the condition of wooden beams subject to stress, and their relative strengths when of different sections and loaded in different ways. The principles of framework naturally grow out of this subject, and here the practical constructor, who has hitherto given little thought to the more abstract side of his calling, may find many familiar devices logically accounted for. Bridges next occupy attention, the mechanical principles governing the design of various types being considered, and we then pass to another section of the book.

The action of forces in the production of motion next challenges the student's attention. We would gladly follow the author in his many clever explanations and illustrations, by which the various kinetic laws are made plain, but to do so would be manifestly beyond the scope of our present task. We can only mention the subjects discussed, and refer our readers to the work itself. The first law of motion,—*i.e.*, if no force act upon a body, it will, if at rest, remain for ever at rest; or, if in motion, it will continue for ever to move with a uniform velocity,—is illustrated by Attwood's machine, of which there is a good engraving. That a heavy body will occupy the same time as a light body in falling through a given space, putting the resistance of the atmosphere on one side—a disturbing condition which the author might have called attention to earlier,—is, of course, a simple matter of fact to the physicist, although there are a great many persons who would be incredulous of the truth of the law until they were convinced by Dr. Ball's simple, yet conclusive, experiments. That the action of gravity is independent of the motion of the body is another truism to the man of science, which the ordinary untrained intelligence might find it still more difficult to grasp without the aid of the author's beautifully simple expositions. We can speak with some sort of authority in this case, as we once spent the best part of half-an-hour vainly trying to convince an artilleryman that the projectile from his piece would reach the surface of the sea exactly at the same time were it fired out by gunpowder in the usual way or were it simply allowed to roll out and drop vertically to the water; supposing of course the piece were pointed horizontally. Had we then had Dr. Ball's experiments to fall back upon our efforts would doubtless have been more successful. That the path of a projectile is a parabola the lay mind will perhaps be more ready to allow, having previously formed no opinion upon the subject; but if there are doubts they will soon be expelled by the illustration selected; which, by the way, affords another excellent combination of blackboard diagram and working experiment. Inertia and the storage of energy are subjects rich in illustration by means of familiar objects, such as the hammer, fly-wheel, punching-machine, &c. The nature of circular motion has a chapter devoted to it, the action of circular motion upon liquids being shown by some very pretty lantern experiments.

The remaining part of the book is occupied by a short treatise on the pendulum and its application to clockwork.

We are pleased to recommend this book for the use of students, and more especially to the fathers of sons who show an aptitude for mechanical studies. At the same time, there is much in it that those of more advanced age may follow with advantage.

Mirabilia Urbis Romæ: The Marvels of Rome, or a Picture of the Golden City. An English Version, &c. By FRANCIS MORGAN NICHOLS. (London: Ellis & Elvey. Rome: Spithoever. 1889.)

MESSRS. ELLIS & ELVEY have done us all a good turn by reproducing for the first time in English this curious and interesting book. For curious and interesting it cannot fail to be to all who have visited or are intending to visit the "Golden City."

Written by an unknown author before the middle of the twelfth century, it became "the standard guide-book of the more learned visitors to Rome from the twelfth to the fifteenth century." What might be said of it now by the more learned visitors to Rome it is not difficult to imagine. Yet the charm of the writer's faith, that "sancta simplicitas" so natural to him, so difficult for us moderns to appreciate, will, we think, make his book in its English clothing a popular one. For there are still some who, in spite of the facts or theories of Professors Darwin and Huxley, can find a charm in the poetry of legend, and in the simplicity of an age of faith.

The book consists of several parts. After the interesting preface comes the main body of the work, the "Mirabilia, or the Marvels of Rome." Beginning his history with the foundation of the city by Noah and his sons, who left Asia after the building of the Tower of Confusion, the author takes us for a peregrination round Rome, describing the origin of its various monuments and the virtues of its various saints, and he concludes with the hope that his book will bring back the magnificence of the Golden City to the remembrance of mankind.

Of the five divisions which follow the Mirabilia, the first and second are perhaps of most interest. "The marvels of the Roman churches" might well make even Dr. Wace a sceptic; while the impression made by Rome upon Benjamin of Tudela, a Hebrew traveller, A.D. 1170, cannot fail to interest every reader. The book is prettily bound, and printed with a frontispiece representing part of the bronze door of St. Peter's, and with a facsimile of a map of Rome drawn about the year 1475, placed before the index. It is interesting to compare this map with Wolgemut's picture in the "Nuremberg Chronicle," printed in 1493. The map is decidedly more correct than the picture. All readers will, we hope, find a charm in the revelation of the childlike simplicity with which a learned traveller of the twelfth century regarded the wonders and miracles which in our author's day added a personal interest to every monument, whether pagan or Christian. Certainly in those days all things were possible to him that believed.

Aid to Survey Practice. By LOWIS D'A JACKSON, Assoc. M. Inst. C.E. London: Crosby Lockwood & Son. Second edition, enlarged. 1889.

THIS book claims to contain a record of observed facts, habits, customs, events, methods, thoughts, and ideas which have occurred to the author at different times, and states that it is not a compilation from other books. It also contains tables, illustrations, and records for reference in surveying and setting out, and in route-surveys of travellers by land and sea. The plates illustrating the surveys are neatly produced, and possess the advantage of having been mostly executed by the author at various times, and are not imaginary. Some rearrangement has taken place in the revision of the first edition, and certain barometric tables, geodetic tables, and astronomical examples added; but definitions of terms, descriptions of easily-visible instruments and appliances, also practical directions for commonplace manipulation, have generally been excluded from the book as unnecessary. The author greatly favours the use of telemetric instruments, adding that ordinary chain measurement is generally far from being so exact as is usually imagined.* We do not agree with this statement, nor with his recommendation that the tallies at every ten links on the chain should read from one end to the other of a chain, instead of from both ends to the middle. The author's collection of trigonometrical formulæ and examples with solutions tends to increase the size of an already bulky volume, and the reader might well have been referred to standard mathematical text-books for this information. His list of scales and their use is very valuable. He draws a distinction between absolute and relative levels. He does not favour the use of telescopic staves, and advocates the old-fashioned use of a plummet to ensure verticality for accurate work in taking levels. He gives the preference to the collimation method of keeping a Level Book. Taken altogether, the book is more a treatise for civil engineers than for architects and land-surveyors, although no practitioner would adopt all the views set forth. Some of the tables connected with curves are improved in arrangement in the new edition, and are given in a more complete form than in the old edition.

The author very properly states that the book was not written with the object of making a surveyor out of an utterly inexperienced person by its perusal alone. No book can ever do this, or go beyond assisting in doing so.

Practical Arithmetic and Graphic Statics. By JOHN WILSON, Lecturer on Building Construction in the Technical School, Manchester.†

UNDER the above attractive title the author seeks to provide instruction in that part of the Honours Examination in Building Construction which requires a knowledge to calculate the strength of girders.

The author wisely recommends that the examples be drawn to the scales he names, which would give diagrams three times the size of those in his book; and, following the principle adopted by Professor Clerk Maxwell, he employs the excellent system so fully explained by Mr. R. H. Bow in his well-known treatise. In the working-out of the examples he selects from previous examination papers dealing with iron-work; the stresses are worked out in pounds, and not according to the English principle of so many tons to the square inch; while in the examples introducing the element of wind-pressure, pounds pressure are correctly assumed. The exercises showing the method of allowing for rivet area in tensional members is good; but the author appears to get a little confused when treating of bending moments, the results of which are described by weights independent of length. Thus, on page 12, "foot tons" are evidently implied, though this is not stated. We also note that point F is omitted in fig. 3 upon this page. Several other examples are worked out, but the figures provided in the plates illustrating graphic statics are not conveniently placed to enable a student to refer to them while studying the letterpress, and the

* There is no survey so accurate as a properly-tied chain-survey, when the country is sufficiently open to dispense with the use of angular instruments.

† Copies can only at present be obtained direct from the author, at Chapel Grove, Urmston, near Manchester.

description given is by no means sufficiently complete to dispense with the use of the more expensive text-books.

Builders' Work and the Building Trades. By Col. H. C. SEDDON, R.E. With illustrations. London: Rivingtons. 1889. Second edition, revised.

IN a former number we reviewed at some length this admirable and high-class work on building construction, which, in regard to accurate scientific knowledge, clearness of expression, and excellence of illustration, is one of the most valuable works of instruction on practical problems of building to which an architectural student can give his attention. We are glad to find that a second edition is called for. As the new edition, though noted as "revised," does not appear to contain any material additions, or to differ in its contents essentially from the former one, it is only necessary here to repeat our formerly expressed high opinion of the work, and to commend it to the attention of those who are studying the practical side of architecture.

Notes and Tables relative to the Strength of Materials. By FREDERICK A. CAMPBELL, Lecturer on Applied Mechanics at the Working Men's College, Melbourne.

THIS pamphlet consists of twenty useful pages, designed primarily for the use of students in Australia, but serviceable also to those who have to design works for that colony. Quality more than quantity characterises these notes and tables, and the author states that it is his intention to supplement them from time to time, as the knowledge of Australian building materials becomes more complete. He invites the records of further experiments upon the strength of colonial bricks, stone, and timber to be sent to him. We trust he will exercise the same discretion in the extension of his pamphlet as he has displayed in its first issue, and not be over-anxious to include every record. We agree with his remark that the two requirements of the practical man are simplicity and accuracy: Long, elaborate formulæ, giving results which are not quite accurate, display great mathematical skill, but, when published, few trouble to peruse them; while more simple formulæ, which are based upon the average results of a long series of experiments, furnish the practitioner with a rule which can be carried in the brain, and applied when required. Moreover, when such rules can be applied graphically, as shown by the author in his table of bending moments and shearing forces, they are more easily remembered. The author includes tables showing the weight, tensile, compressive and shearing strengths of building stones, bricks, cements, Australian hard-woods and soft-woods, cast and wrought-iron and steel, while his notes upon the special points to be observed in their selection and employment are exceedingly practical.

A new Shilling Book of Alphabets, Plain and Ornamental, including sets of Numerals and many Decorative Designs. London: Field & Tuer.

IN a prefatory note the publishers say that "a good, cheap, and dependable book of Alphabets" is much wanted. The word "dependable" we presume implies that those given here are all from old sources, and that what we are offered is archæological correctness. This is of value when old types of lettering are employed; and Messrs. Field & Tuer should be in the way of getting good examples.

Among the forms of letter given, that on page 4, called "Roman," but a very modified Roman, is a fine bold-designed set of plain letters. Another very good ornamental letter, of the type in which the ornamental treatment consists only of the lines themselves of the letters, is that on page 20, also that on the following page, giving the same forms of letters with a marginal enclosing line drawn round the outline at a little distance from the main block of the letter, giving an effective breadth and architectural character to the letters. The "crazy-lettering," we should say, is more honoured in the breach than in the observance. Among the highly-decorative initials are some good collections, from old examples apparently, from the style of the figures and other accessories. To those who do not feel equal to designing their own letters the book will be of use; and if "dependable," as it claims to be, it is also "cheap."

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

7,182, Bolts for Coach-house and Heavy Doors. W. Goodchild.

According to this invention, a link motion placed in the centre of the door and actuated by a handle throws the two bolts locking each side of the door simultaneously.

8,485, Fireproof Columns. R. Mannes Mann.

Columns when made of cast-iron are liable to crack and give way in case of fire. This invention relates to a construction of metallic columns which, it is claimed, protects them from the destructive influence of fire. Each column consists of two tubes, preferably of steel one within the other, each or more particularly the inner tube, being strong enough to support considerably more than the load which the two together have to bear. Between the one tube and the other there is an annular space, which in most cases need not exceed ½ in. in width; this space is filled with material such as asbestos, which is incombustible and a bad conductor of heat. In case of fire, although the outer tube might be greatly heated, and consequently weakened, the inner tube would remain comparatively cool, retaining sufficient strength to support the load.

8,599, Improved T-square. W. Palmer.

The blade and stock of the T-square which is the subject of this invention are held together by a bolt and nut, or a screw-pin, with one or more spring-washers introduced. A spring-washer may, if desired, do duty also as a nut. The spring-washer is made of thin steel, and is in form like an inverted saucer. The bolt-hole in the blade is extended to a slot running right out, thus allowing the blade to be removed by simply relieving the spring-washer of its load. By the introduction of the spring-washer a sufficient range is obtained between being hard screwed up and of being slack to admit of the pressure being so adjusted that the angle of the blade can be altered without touching the bolt or nut, and at the same time be held sufficiently firm by the spring of the washer or washers to work with.

17,372, Movable Timber-sawing Machines. G. Stephan.

The machine which is the subject of this patent consists of a semicircular main body, each end of which rests on a carriage which runs on rails. A band-saw worked by a small engine is used, and timber or material is placed on fixed trestles between the two rails.

3,872, Pavement Blocks. L. J. Caldwell.

The pavement which is the subject of this patent is made of T-shaped blocks of iron, burned clay, or other suitable material, laid in alternately reversed positions, so that they overlap each other. Each block of the pavement has a support from an area of the underlying bed greatly in excess of its upper surface. The interstices are filled in with sand.

NEW APPLICATIONS FOR PATENTS.

May 27.—8,747, J. Beresford, Water-closets.—8,772, H. Le Mesurier, Emergency Exit-doors for theatres, &c.—8,794, R. Roberts, Smoke-consuming Grates or Fireplaces.—8,801, N. Sörensen, Door-locks, &c.

May 28.—8,845, N. Proctor and others, Machines for Making Bricks and Briquettes.—8,863, Esdaile & Co. and L. Tavoner, Saw-sharpening Machines.

May 29.—8,904.—A. Hogan, Machines for Cutting Latha.—8,914, A. Tonks and F. Baker, Flush Bolts for Doors, &c.—8,961, E. Hanff, Window Fastenings.

May 30.—9,000, E. Mann, Raising and Lowering Window-sashes, &c.—9,011, J. Downes, Chimney-top.—9,024, S. Capon, Gate or Door Hinge.

May 31.—9,045, G. Billing, Window-sash Fastener.

June 1.—9,114, P. Stein, Double-lock Latch.—9,119, E. Piford, Electric Bells.—9,126, T. Bear and C. Whitefield, Mitreing Machines.

PROVISIONAL SPECIFICATIONS ACCEPTED.

304, J. Sutcliffe, Window-sash Fasteners.—5,775, J. Denny, Bricks, Tiles, &c.—6,037, S. Grimshaw, Opener for Windows, Ventilators, &c.—6,155, W. Charlton, Hinges.—6,624, J. Farrar, Fire-grates.—6,898, W. Barwell, Draught, Rain, and Dust Excluder for Doors.—6,980, A. Diss, Metal Dowel or Tenon for Door-frames, &c.—7,109, A. Rammage, Fireproof Partition for Building Construction.—7,241, J. Wilson, Walls, Buildings, &c.—7,263, W. Thomas, Door-stop.—7,404, J. & D. Rowell, Iron Walls and Fences.—7,592, A. Hogan, Plasterer's Lath.—7,652, C. Butcher, Kitchen Ranges.—7,853, W. Syer and W. Clark, Ventilating.—8,182, J. Burford, Fireplaces.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

8,412, H. Rice, Securing Opened Doors or Hinged Windows in their position.—8,710, W. Thompson, Ventilating.—8,757, D. Williams, Flushing Cistern.—8,829, J. Calder, Water-closet Cisterns, &c.—10,180, J. da Fonseca, Water-closets and Urinals.—10,288, Z. and J. Pack, Brick-moulding Machines.—10,544, F. Winser, Flushing Tanks or Cisterns.—10,842, W. Davies, Flushing Apparatus.—15,857, W. Kinnear, Metallic Ceilings, &c.—3,057, J. Evans, Fastener for Window-sashes, &c.—3,088, W. Assiter, Joints of Stoneware Pipes, &c.—4,733, J. Keene, Spring Hinges.—5,210, F. Trabert, Contrivance for use in Scaffolds, &c.—6,183, L. Friedrich, Tombstones, Memorial Tablets, &c.—6,517, G. Hayes, Fireproofing Buildings.—6,584, G. King, Compounds to Restrain the Setting of Plaster.

RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

MAY 31.—By WARD & CLARKE.

Willesden—19 to 29 and 39 to 48 (odd), Waldo-rd., f., r. £234 p.a. £1,845*

By WYATT & SON (at Bognor).

Bognor, near—Enclosures of f. land, about 26 acres, in 11 lots 2,720
F. meadow land, 7a. 1r. 12p. 1,100
F. meadow land, 4a. 1r. 27p. 630
F. brickfield and 3a. 1r. 6p. 260
F. house and outbuildings 390
A cottage and three plots of f. land 525
"Norfolk House," with grounds, f. 800

JUNE 3.—By ELLIS & SON.

Lewisham—63 to 66, Thurston-rd., u.t. 73 yrs., g.r. £10, r. £89 p.a. 815

By BORNHAM & REEVES.

Paddington—11 and 12, Bathurst-st., u.t. 46 yrs., no g.r., r. £230 p.a. 3,110
Kentish-town — 35 and 36, Alma-st., u.t. 35 yrs., g.r. £10, r. £60 p.a. 485

By C. W. REX.

Regent's-park—6, Stanhope-ter., leasehold, o.r. £80 p.a. 400

By T. CHAMPNESS.

Spitalfields—7, Prince's-st., f., r. £54 p.a. 940
16a, Church-st., and 8, Prince's-st. and stabling, f., o.r. £395 p.a. 2,805
73 and 74, Brushfield-st. and other premises, f., o.r. £415 p.a. 5,000

By WRATHERALL & GREEN.

Camden-town—The lease of the "Eagle" public-house, u.t. 45 yrs., g.r. £10, r. £320 p.a. 17,000
Kensington—252 and 256, Kensal-rd., u.t. 79 yrs., g.r. £16, 16s., r. £58 p.a. 265
122 to 128 (even), Kensal-rd., u.t. 78 yrs., g.r. £25. 4s., o.r. £128 490
Holborn—26, Brooke-st., f., r. £45 p.a. 700
Walthamstow, Higham-st.—"Alicia Cottage," f. 100

By BOYCE & EVENS.

Bethnal-green—23 and 24, Bonwell-st., u.t. 50 yrs, g.r. £9, r. £52 p.a. 300
Haggerston—47, Lee-st., u.t. 30 yrs., g.r. £3, r. £26. 12s. p.a. 220
39, Fellows-st., u.t. 16 yrs., g.r. £2, r. £33. 10s. p.a. 125
8, Basing-pl., u.t. 15 yrs., g.r. £2, r. £36. 8s. p.a. 185
72 and 74, Hoxton-st., the lease of, u.t. 11 yrs., r. £46 p.a. 105

By J. & W. JOHNSON & CO.

Seven Sisters'-rd.—6 and 8, Pooles-pk., u.t. 76 yrs., g.r. £13, r. £58 p.a. 440
9, Pooles-pk., u.t. 76 yrs., g.r. £6, r. £30 p.a. 220

By W. V. WILLSON.

Caledonian-rd.—F.g.r. of £10 with reversion in 87 yrs. 230

JUNE 4.—By H. C. NEWSON.

Kensington—3 and 4, Douro-pl., u.t. 37 yrs., g.r. £18 1,830
Tulse-hill—No. 54, and cottage, u.t. 23 yrs., g.r. £15, r. £90 p.a. 630

By GLOVER & HARRISON.

Sydenham—"Mount Pleasant Cottage," f., o.r. £31 p.a. 230

By RUDLEY, SON, & VINE.

Kentish-town—30 and 32, Grafton-ter., u.t. 64 yrs., g.r. £16, o.r. £76 p.a. 430
Wandsworth-rd.—L.g.r. of £26. 6s., u.t. 44 yrs. 420

By C. E. JOY.

Regent-st.—L.g.r. £83, at g.r. of £10, 2s. 6d., u.t. 34 yrs. 900
Tollington-park—F.g.r. of £36, with reversion in 83 yrs. to o.r. of £395 p.a. 940
F.g.r. of £35, with reversion in 83 yrs. to o.r. of £154 p.a. 660

By DRIVER, TRUSON, & CO.

Cambridge, near—"Milton Hall" and 78a., f. 5,600

By BROAD & WILTSHIRE.

Fulham—16 to 31 (even), Reporton-rd., f., o.r. £381 p.a. 2,800
50, 52, and 54, Marville-rd., u.t. 87 yrs., g.r. £17, r. £85. 16s. p.a. 580
60 to 66 (even), Redgrave-rd., u.t. 90 yrs., g.r. £40, o.r. £190 p.a. 1,800
26 and 36, Chesilton-rd., u.t. 91 yrs., g.r. £16, r. £90 p.a. 780
Russell-sq.—49, Woburn-pl., and stabling, u.t. 20 yrs., g.r. £23. 8s., r. £126 p.a. 770
Drury-la.—24, Parker-st., f., r. £55 p.a. 1,200

By TURNER, RUDGE, & TURNER.

Herne, Surrey—Whitewood House Farm and 17a. 3r. 7p., f. 630
Hanover-sq.—14, Prince's-st., f., r. £225 p.a. 5,050
East Grinstead—"The Rocks," and 7a. 2r. 9p. and tannery, f. 1,550
Two f. plots of land, 2a. 2r. 20p., r. £8 p.a. 320
Three f. cottages, r. £23. 8s. p.a. 150
Two f. cottages, and 2a. 3r. 15p. 700
F. enclosures of land, 27a. 1r. 35p. 1,300
F. cottage and orchard, 1a. 1r. 25p. 360
Two plots of f. land 320

* Reported in error last week as sold for £625.

By H. W. ILES.

Limehouse—1 and 2, Trigg's-pl., c., r. £31. 4s. p.a.	£240
Poplar—2, 4, and 6, Bygrove-st., u.t. 39 yrs., g.r. £12, r. £56. 10s. p.a.	255

By WALTON & CO.

Maidenhead—"Ockwell's" and 2½ acres, u.t. 97 yrs., g.r., r. £45	2,500

By A. RICHARDS (at Enfield).

Enfield—1 to 5, Hilder-ter., f., r. £135. 4s. p.a.	1,000
1 to 4, Tuits-cottages, f., r. £44 p.a.	360
Jasper-rd.—"Nichols Villa," u.t. 52 yrs., g.r. £2	200
Ponder's End, High-rd.—"Clifton Villa" and cottage, f., r. £39 p.a.	980

By Messrs. COBB (at Chatham).

Chatham—Four cottages, yard, and plot of f. land Nos. 263 to 269 (odd), High-st., seventeen cottages, &c.	1,050
Nos. 271, 273, 279 to 285 (odd), High-st., f., r. £97 p.a.	4,300
F.g.r. of £12, with reversion in 22 yrs.	2,635
F.g.r. of £12, with reversion in 29 yrs.	625
287 to 293 (odd), High-st.. and four cottages, f., r. £90 p.a.	330
F. rental of £46 p.a., with reversion in 32 yrs.	1,675
299, High-st., and four cottages, f., r. £50 p.a.	1,050
301 to 307 (odd), High-st., and six cottages, and 302 to 308 (even), The Brook, f., r. £113. 18s. 6d. p.a.	675
307, 309, 311, and 313, High-st., f., r. £68 p.a.	1,650
315 to 323 (odd), High-st., f., r. £115 p.a.	2,800

JUNE 5.—By MAPLES & BENNETT.

Fulham—5 and 7, Finborough-rd., u.t. 60 yrs., g.r. £25, r. £145 p.a.	1,050
Brixton—20, Talma-rd., u.t. 85 yrs., g.r. £7, e.r. £32 p.a.	290
Battersea—2, Victoria-rd., u.t. 87 yrs., g.r. £10. 10s., e.r. £45 p.a.	240
Shepherd's-bush — 25 and 27, Hetley-rd., u.t. 90 yrs., g.r. £18, r. £74 p.a.	365
Putney-bridge-rd.—A plot of f. land	430

JUNE 6.—By J. & R. KEMP.

Sunbury, Green-st.—"Blakesley Lodge," f., with possession	525

By BEADEL & CO.

Kent, Bromley—Enclosures of f. land, 42a. 0r. 19p.	2,000
"The Chequers" public-house," f., r. £50 p.a.	1,700
"The Crooked Billet" beer-house and 23a. 0r. 21 p., f.	3,000
Freehold woodland, 32a. 3r. 7p.	1,000
Two plots of f. land	130

By M. LIBELL.

Bow—104 to 110 (even), Parnell-rd., u.t. 75 yrs., g.r. £14, r. £88 p.a.	475
Lower Clapton—128, Clifden-rd., f., e.r. £36 p.a.	200

By REYNOLDS & EASON.

Brixton—44, Gresham-rd., u.t. 75 yrs., g.r. £10, r. £65 p.a.	440
Kingsland—35, Mortimer-rd., u.t. 27 yrs., g.r. 8s., with possession	215

By NEWBON & HARDING.

Crouch-end—36, Crouch-end-hill, u.t. 71 yrs., g.r. £13, r. £50 p.a.	475
42, Crouch-end-hill, u.t. 71 yrs., g.r. £12. 10s., r. £45 p.a.	490
Holloway—1, Anatola-rd., and 32, Girdleston-rd., f., r. £60 p.a.	640
11, Southcote-rd., u.t. 80 yrs., g.r. £7. 7s., r. £40 p.a.	450
Hornsey—102, Turnpike-la., u.t. 83 yrs., g.r. £9. 10s., r. £40 p.a.	320
Islington—An i.g.r. of £26. 5s., u.t. 38 yrs., g.r. £13 p.a.	195
Holloway—56, 58, and 60, Poole's-park, u.t. 76 yrs., g.r. £13, r. £90 p.a.	580
64 to 70 (even), Poole's-park, u.t. 76 yrs., g.r. £16, r. £133 p.a.	765
72, Poole's-park, u.t. 76 yrs., g.r. £4, r. £30 p.a.	190

By BLAKE & DANNATT.

Erith—17 to 20, Colebrook-st., 1 to 6, Colebrook-vale, and a plot of land, f.	1,370

By FAREBROTHER, ELLIS, & CO.

Surbiton, Grove-la.—"Grove Lodge," f.	1,200
Hampstead—A plot of land, let at £20 a yr., for 91 yrs.	
St. John's Wood—116, Boundary-rd., u.t. 61 yrs., g.r. £10, r. £65 p.a.	535

JUNE 7.—By HUMBERT, SON, & FLINT.

Bushey Heath—The f. house "Sparrow Herne," and 12a. 1r. 24p.	2,585
Regent's-park—109, Albany-st., u.t. 26 yrs., g.r. £15, r. £65 p.a.	550
Harlesden—1, Harlesden-grove, u.t. 90 yrs., g.r. £10. 10s., r. £30 p.a.	275

By H. SCRUTON.

Mortlake—F.g.r. £42. 10s., u.t. 86 yrs., g.r. £16. 16s.	370

By R. TIDEY & SON.

Kingsland—140 to 148, Southgate-rd., u.t. 39 yrs., g.r. £14, r. £212 p.a.	1,985
Hackney—40, Victoria-park-rd., u.t. 42 yrs., g.r. 10s., r. £37 p.a.	370
L.g.r. of £24 p.a., u.t. 42 yrs.	380

By GEO. GOULDSMITH, SON, & CO.

Deptford—1 to 11, Manor-cottages, f., r. £316 p.a.	2,430
Warwick-sq. — 17, Gloucester-st., u.t. 40 yrs., g.r. £10, with possession	650
Sydenham, Russell-st.—F. stabling, r. £34. 16s. p.a.	250

[*Contractions used in this list.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; yd. for yard, &c.]

New Isolation Hospital at Hornsey.—The new Isolation Hospital, lately erected in Tatterdown-lane by the Hornsey Local Board, for the reception of persons suffering from infectious diseases, will be opened this (Saturday) afternoon, June 15.

MEETINGS.

SATURDAY, JUNE 15.

Architectural Association.—Vacation Visit to Elizabethan mansion at Parham, Sussex.

St. Paul's Ecclesiological Society.—Visit to Stepney Church at 3.30 p.m., and to Bow Church at 4.30 p.m.

Royal Institution.—Professor W. Knight on "Idealism and Experience in Art and Life." 3 p.m.

Edinburgh Architectural Association.—Annual Excursion to Peebles Churches, Neidpath Castle, Drochil Castle, Lyne Church, and Barns Tower.

MONDAY, JUNE 17.

Royal Institute of British Architects.—Presentation of the Royal Gold Medal to Sir Charles Newton, K.C.B.; and Paper by Professor Baldwin Brown on "Recent Advances in the Study of Architectural History." 8 p.m.

WEDNESDAY, JUNE 19.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting. 8.30 p.m.

Royal Meteorological Society.—7 p.m.

THURSDAY, JUNE 20.

Society of Antiquaries.—8.30 p.m.

SATURDAY, JUNE 22.

Glasgow Architectural Association.—Excursion to Dalzell House, Motherwell, Hamilton Palace, Bothwell Castle, and Bothwell Church.

Miscellanea.

British Archæological Association.—The closing meeting of the session was held on Wednesday, the 5th inst., Mr. W. H. Cope, F.S.A., in the chair. Mr. H. Berney exhibited a plan of the Roman foundations recently discovered at Beddington, on the Croydon Sewage Irrigation Farm. A small chamber has been excavated, but the remains are doubtless of much larger extent, and probably have some relation to the building found about twelve years ago. The Rev. Canon Collier sent plans of a Roman potters' kiln at Botley, Hants, recently explored. It is 7 ft. 9 in. in diameter, circular, with a long sloping entrance, and a seat-like shelf. Mr. C. H. Compton described the portions of the western wall of London now laid bare by the pulling down of houses at Ludgate; and Mr. Loftus Brock, F.S.A., produced a plan showing their relation to the general arrangement of the City walls. Mr. Langdon exhibited several rubbings of Pre-Norman incised stones in Cornwall. One of these was from an altar-slab now in a garden at Pendarves, and similar to another in Camborne Church. Both are inscribed, the inscription on the first being all but illegible. The other is inscribed + LEUIUT IUSIT HEC ALTARE PRO ANIMA SUA. A key pattern, similar to what appears on the Penally Cross, forms the border. Mr. W. Myers, F.S.A., exhibited a fine collection of Egyptian objects brought by him from the East within the last few months. Mr. J. T. Irvine announced that part of the foundation walls of an apse had been found at Peterborough Cathedral, forming the east end of the north aisle, similar to that recently found at the south aisle. A paper was then read by Mr. W. de Gray Birch, F.S.A., on the newly-discovered Anglo-Saxon charter of Edward the Confessor, now in the British Museum. It confirms the previous charter of Leofric.

A New Suburban Railway.—We are informed that a contract has been entered into for the construction of a new line of railway from Harrow to Stanmore, which will, when opened, provide for the public convenient communication with one of the most beautiful and picturesque districts within easy reach of the metropolis. The purchase of the requisite land has been completed by the Harrow and Stanmore Railway Company's Surveyor, Mr. R. T. Wreathall, and the line will be commenced forthwith, so that it may be opened at the earliest possible date. It will form a junction with the London and North-Western Railway at Harrow Station, with a terminus at Stanmore, close to the village, and as the line will be worked by the London and North-Western Railway Company, the public are likely to get the best of service and accommodation.

Artisans' Dwellings in Copenhagen.—The Artisans' Dwelling Association of Copenhagen,—the only society of this kind in that city,—has issued its report for last year, which shows that only a few new dwellings were added to the Association's property, but 350 model-dwellings are in course of erection on a site acquired near the new harbour. The hygienic state of the dwellings was very satisfactory, the death-rate in the same being only 14·9 per cent., as against 23·7 per cent. in the rest of the city. Two families occupy each dwelling. A dividend of four per cent. is declared.

The Society for the Preservation of Ancient Egyptian Monuments.—With a view to arrest the gradual destruction of Egyptian monuments by the combined operations of natural causes and of depredatory Arabs, tourists, and curiosity-mongers, a Society bearing the foregoing title has been recently formed. Sir Henry Layard, Mr. Flinders Petrie, Lord Wemyss, Sir William Gregory, Sir Frederic Leighton, Mr. Le Page Renouf, Lord Wharncliffe, Lord Carlisle, Sir Colin Scott-Moncrieff, and General Brackenbury are leading members of its executive committee. Mr. E. J. Poynter, R.A., is hon. secretary, and Mr. Bertram Currie is hon. treasurer. According to the *Times*, both Lord Salisbury and the Egyptian Government have warmly testified their appreciation of the intentions of the society. The Egyptian Government, indeed, have taken the important step of causing a careful survey to be made of those ruined temples and palaces which suffer more severely than others from perennial infiltrations of the Nile, and from the destructiveness of human agencies. A full report has been drawn up by a French engineer, Grand Bey, and the estimated cost of propping masonry in imminent danger of falling, of draining and clearing various sites, and of fencing round groups of ruins, from Philæ to Abydos, is 8,500*l*. The society proposes to raise this sum by public subscriptions, and to place it with the least possible delay at the disposal of the Egyptian Government, who will thus be enabled to at once rescue the remains of some twenty most important monuments, such as the temples at Esneh, Luxor, and Karnak. The Egyptian Government has given a further earnest of its desire to do its utmost in the matter by undertaking to provide proper inspection and guardianship of the ruins in future. As nothing, however, can be spared from the Egyptian Exchequer, the Government has sanctioned a special impost, which will yield 1,000*l*. a year, which is the estimated cost of an effective system of guarding the ruins.

Andover.—At the Church of St. Mary Bourne, Messrs. Bussell, Gibbs, & Co. have just completed a stained-glass window, in three lights, in the centre one of which is a figure of our Lord, and in the sides St. Peter and St. John. The figures are under canopies of white and gold, and beneath them are scrolls with appropriate texts. In the tracery are shown cherubim and seraphim, the whole being surmounted by the Holy Dove descending, and shedding rays of light. Beneath the window will be placed a brass tablet, with the following inscription:—"This window and brass was placed by Emma Martha Easton, of this parish, in affectionate remembrance of her father, the Rev. Wm. Easton, many years vicar of this parish; her mother, Anna Easton; and brother, Lieut. Wm. Easton, R.N., who lie in the chancel; also to the memory of her five sisters, who are buried in the churchyard adjoining."

The Russian Petroleum Industry.—A Russian engineer, M. W. de Tchicatchef, estimates that the diurnal flow of petroleum from the Baku springs amounts to 88,000 barrels, as against 25,300 in the United States. The chief obstacles to the development of the Baku industry are the want of cheap storage and the absence of means of transport. However, the railway to Batoum, on the Black Sea, and the building of cistern steamers, in which the oil is shipped in bulk, have done much towards developing the Russian petroleum industry. M. Tchicatchef is of opinion that at no distant date all railways in Southern Russia, the Levant, India, and Central Asia will solely use the oil as fuel.

New Free Harbour and Warehouses in Copenhagen.—The Danish Government has decided upon constructing a free harbour, with extensive warehouses, near Copenhagen, similar to those at Hamburg. Although many plans were sent in, only one satisfied the Minister of Public Works, and that only in part. The cost of the work is estimated at 60,000*l*.

Cremation in Sweden.—The cause of cremation is making good progress in Sweden, there being now, in addition to Stockholm, societies in Gothenburg, Gefle, Helsingborg, and Orebro, numbering a total of 3,189 members. There are now two crematoriums, and more are being built. Last year, the process was declared legal by the Swedish Ecclesiastical Court.

Herne Bay.—A Parochial Institution, comprising lecture-hall and schools for 300 boys, girls, and infants is about to be erected. Mr. Ernest Turner is the architect.

The English Iron Trade.—The English iron market has been quiet during the past week, the holidays having interfered not so much with work as with fresh business. Notwithstanding the quietness of the market, prices of pig-iron have remained steady, with a rising tendency. The inquiry for manufactured iron has been small, with values very firm, owing to the increased cost of pig-iron and coke. There is a brisk trade in steel. Shipbuilding is quieter in Scotland, owing to the strikes, but the yards in other shipbuilding centres continue to present a busy appearance. Engineers have abundance of work.—*Iron.*

Obituary.—Mr. John Frederick La Trobe Bateman, F.R.S., V.P.I.C.E., of Moor-park, Farnham, and Great George-street, Westminster, died on the 10th inst., at Moor-park, Farnham, at the age of 79, after a severe illness. He had acquired a high reputation for his scientific attainments, his name having been associated with several of the principal engineering achievements of the day. He supplied Glasgow with water from Loch Katrine, and proposed a scheme to furnish London with water from Lake Bala in Wales. At the time of his death he was engaged in engineering work in connexion with docks and gas at Buenos Ayres and water service at Minorca.—*Times.*

The Horwich Surveyorship.—For the post of surveyor to the Horwich Local Board, vacant by the resignation of Mr. Joseph Dawson, C.E., there were no fewer than 175 applications, the salary offered being 175*l.* per annum. Mr. Joseph Jackson, the Surveyor to the Ormskirk Local Board, has obtained the appointment.

PRICES CURRENT OF MATERIALS.

	£. s. d.	£. s. d.
TIMBER.		
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I. ....load	11 0 0	15 0 0
Sequoia, U.S. ....foot cube	0 2 3	0 3 0
Ash, Canada ....load	3 10 0	5 0 0
Birch ,, ...load	3 10 0	6 0 0
Elm ,, ...load	4 0 0	6 0 0
Fir, Dantsic, &c. ....load	2 0 0	3 10 0
Oak ,, ...load	2 10 0	3 10 0
Canada ....load	3 10 0	4 10 0
Pine, Canada red ....load	5 10 0	7 10 0
,, yellow ....load	3 5 0	4 0 0
Lath, Dantsic ....fathom	3 10 0	5 10 0
St. Petersburg ....fathom	4 10 0	5 10 0
Wainscot, Riga, &c. ....log	5 0 0	6 10 0
Deals, Finland, 2nd and 1st ...std.	2 15 0	4 5 0
,, ,, 4th and 3rd ....std.	9 10 0	11 0 0
Figs ....std.	8 0 0	9 0 0
St. Petersburg, 1st yellow ....std.	7 10 0	9 0 0
,, ,, 2nd ,, ...std.	11 0 0	15 0 0
,, ,, white ....std.	10 0 0	11 0 0
Swedish ....std.	7 10 0	10 10 0
White Sea ....std.	9 0 0	16 0 0
Canada, Pine, 1st ....std.	9 10 0	17 0 0
,, ,, 2nd ....std.	16 0 0	26 10 0
,, ,, 3rd, &c. ....std.	11 0 0	17 10 0
,, Spruce, 1st ....std.	8 0 0	10 10 0
,, ,, 3rd and 2nd ....std.	9 10 0	11 0 0
New Brunswick, &c. ....std.	7 10 0	9 0 0
Battens, all kinds ....std.	6 15 0	8 15 0
Flooring Boards, sq., 1 in., prepared, First ....sq.	0 10 0	20 0 0
Second ....sq.	0 11 0	0 14 6
Other qualities ....sq.	0 8 0	0 10 9
Cedar, Cuba ....foot	0 5 6	0 7 9
Honduras, &c. ....foot	0 0 4½	0 0 4½
Mahogany, Cuba ....foot	0 0 4½	0 0 4½
St. Domingo, cargo average ....foot	0 0 4½	0 0 6½
Mexican ,, ...foot	0 0 4½	0 0 6½
Tobasco ,, ...foot	0 0 4½	0 0 5½
Honduras ,, ...foot	0 0 5½	0 0 6½
Box, Turkey ....ton	0 0 5½	0 0 6½
Rose, Rio ....ton	4 0 0	12 0 0
Bahia ....ton	15 0 0	20 0 0
Satin, St. Domingo ....foot	14 0 0	18 0 0
Porto Rico ....foot	0 0 6	0 1 0
Walnut, Italian ....foot	0 0 2	0 1 3
	0 0 4½	0 0 6½
METALS.		
IRON—Bar, Welsh, in London ...ton	5 5 0	5 10 0
,, ,, at works in Wales ...ton	4 15 0	5 0 0
,, Staffordshire, in London ...ton	5 10 0	6 10 0
COPPER—		
British, cake and ingot ....ton	45 0 0	48 0 0
Best selected ....ton	47 0 0	47 10 0
Sheets, strong ....ton	52 0 0	53 0 0
Chili, bars ....ton	42 5 0	0 0 0
YELLOW METAL ....lb.	0 0 5	0 0 5½
LEAD—Sheet, English ....ton	13 10 0	14 0 0
SPELTER—		
Silesian, special ....ton	18 0 0	18 2 6
Ordinary brands ....ton	17 17 6	18 0 0
TIN—		
Straits ....ton	92 0 0	0 0 0
Australian ....ton	92 0 0	0 0 0
English Ingots ....ton	95 0 0	0 0 0
ZINC—English sheet ....ton	21 0 0	23 0 0
OILS.		
Linseed ....ton	20 10 0	21 0 0
Cocoanut, Cochin ....ton	26 10 0	27 10 0
Ceylon ....ton	24 10 0	24 15 0
Palm, Lagos ....ton	24 0 0	25 0 0
Rapeseed, English pale ....ton	27 0 0	0 0 0
,, brown ....ton	25 10 0	0 0 0
Cottonseed, refined ....ton	26 0 0	27 10 0
Tallow and Oleine ....ton	19 0 0	45 0 0
Lubricating, U.S. ....gal.	0 0 6	0 0 0
,, refined ....gal.	0 0 7	0 0 0
TAR—Stockholm ....barrel	1 3 0	1 3 6
Archangel ....barrel	0 15 9	0 16 0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Repairing & Pitching with Stone, Marsh Bank	Lancaster Corporation	A. Creer	June 19th	ii.
Asphalting and Tarpaving Works	Tottenham Local Board	J. E. Worth	do.	ii.
Widening Railway Bridge and Road Works	L. & N. W. Ry. Co.	*Official*	June 19th	ii.
Window Blinds	Corporation of London	do.	do.	xii.
Painting, Repairs, &c., Caterham	Met. Asylums Board	do.	June 20th	ii.
Extension of Laundry	Kensington Guardians	H. H. Bridgman	do.	ii.
Swimming Bath, &c.	St. John's, Hampstead	Mr. Spalding	June 21st	ii.
Widening Bridge	Cumberland Coun. Co.	*Official*	June 22nd	xii.
New Lavatories, Sanitary Apparatus, &c.	St. Marylebone Guar.	H. Saxon Snell & Son	June 24th	xii.
Repairs to Viaducts, Hampstead Heath	London County Council	*Official*	do.	xii.
Surface Drainage Works, &c., Hanwell	Central London District School	A. Allen, Jun.	do.	ii.
Cottage Residences, Grange Estate, Catford		F. & W. Stocker	do.	ii.
Engine and Boiler House, &c.	Borough of West Ham	L. Angell	June 25th	xiii.
Well Sinking, &c.	West Cowes Loc. Bd.	H. Moore	do.	ii.
Roadmaking Work	Lewisham Bd. of Wks.	*Official*	do.	ii.
Road Materials	Greenwich Bd. of Wks.	do.	do.	xii.
Masons' and Pavors' Work	do.	do.	June 26th	xii.
Re-construction of Culverts, &c.	do.	do.	do.	xii.
New Brick and Pipe Sewers, &c.	Wood Green Local Bd.	H. Robinson	June 27th	xii.
Timber Groynes on Sea Front	St. Marylebone Vestry	*Official*	do.	xii.
Drainage and Sanitary Works	Level of Romney Marsh	B. D. Good	do.	ii.
Boilers, &c.	Tonbridge Union	W. Oakley	do.	xiii.
Broken Granite	Westminster Union	J. Waldram	do.	xii.
Flints	Walthamstow Loc. Bd.	*Official*	June 28th	xii.
Repairs, Painting, Colouring, &c., Slough	do.	do.	do.	xiii.
New Outlet Sluice, Watercourse, &c.	British Orphan Asylum	Edgington & Summerbell	do.	xiii.
Extension of Sewer Outfall	Havering & Dagenham Com. of Sewers	J. Hickman Barnes	June 29th	xii.
New Municipal Offices	Eastbourne Town Coun.	C. Tome	July 1st	xii.
Granite Kerb	York Corporation	*Official*	do.	xiii.
Station Works, Dudley Hill	Croydon Corporation	W. Powell	do.	ii.
Higher Grade School	G. N. Ry. Co.	J. Fraser & Son	July 2nd	xii.
Painting, &c., Works, Plymouth	Llanelly School Board	E. H. Lingen Barker	July 4th	ii.
Superstructure of University Coll., Liverpool	War Department	*Official*	July 9th	xii.
Warming Apparatus		A. Waterhouse, R.A.	Not stated.	xii.
Execution of Works	School Bd. for London	*Official*	do.	xii.
Cleaning and Painting Schools	do.	do.	do.	xi.
Annual Repairs to Buildings and Furniture	do.	do.	do.	xii.
	do.	do.	do.	xii.
	do.	do.	do.	xii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Surveyor and Engineer	Sutton Coldfield Corp.	300*l.*	June 20th	xvi.
Surveyor	Solihull, U.K.S.A.	200*l.*	June 22nd	xvi.
Draughtsman in Hydrographical Department of the Admiralty	Civil Service Com.	Not stated	June 28th	xvi.
City Surveyor	Carlisle Corporation	350*l.*	July 4th	xvi.

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *Noon on Thursdays.*]

BALLYBRICKEN (Ireland).—For new parochial house, Ballybricken, Waterford, for Rev. P. F. Flynn, P.P. Mr. Walter G. Doolin, M.A., architect, 20, Ely-place, Dublin. Quantities by Mr. H. McConnell, Dublin:—

Geo. Nolan, Waterford (accepted) ... £2,750 0 0
(Exclusive of internal plumbing, drainage, &c.)

CAMBORNE (Cornwall).—For the reseating, renovation, and other works to the Centenary Wesleyan Chapel. Mr. Oliver Caldwell, architect, Penzance:—

Moyle & Nicholas, Redruth	£1,205 0 0
John Read, Plymouth	1,149 0 0
E. Pooley, Carn Brea	1,107 16 0
Moyle & Richards, Camborne	1,094 10 10
Skews, Richards, & Berryman, Camborne	1,087 14 5
Mills & Son, & Rowse, Camborne*	1,023 0 0

* Accepted.

[Architect's estimate, £1,138 0 0]

For Mason's Work Only.

A. Delbridge, Camborne ... 290 0 0

FARNHAM ROYAL (Bucks).—For additions to "Woodgate," Farnham Royal, for Mr. W. Baylis. Messrs. Saville & Martin, architects, 86 and 87, Strand, W.C.:—

Earl	£505 0 0
Crowhurst	431 0 0
Wheeler	400 0 0

LEDBURY.—For alterations and additions to "The Grange," Bosbury, near Ledbury, for Mr. S. Willcox. Mr. G. M. Silley, architect, 17, Craven-street, Strand. Quantities by Mr. S. Alen, 240, Lancaster-road, W.:—

Hill	£2,185 0 0
Stephens & Bastow	2,100 0 0
Bowers	2,095 0 0
Jones	1,983 0 0
Wibley	1,894 0 0

LEWISHAM.—For alterations and additions to "The Lion and Lamb," Hugh-street, for Messrs. H. & V. Nicholl, Limited. Mr. Albert L. Guy, 78, High-street, Lewisham, architect:—

Kennard	£490 0 0
Jerrard	443 0 0
Pritchard (accepted)	390 0 0

LEWISHAM.—For painting and repairs to "Anchor" Brewery, for Messrs. H. & V. Nicholl, Limited. Mr. Albert L. Guy, architect, 78, High-street, Lewisham:—

Hoare	£167 10 0
Jerrard	163 0 0
Mograh	155 0 0
Pritchard (accepted)	141 0 0

LEYTONSTONE.—For the erection of three houses in the Leytonstone-road, E., for Messrs. E. Blundell. Mr. T. W. Fletcher, architect, Bow:—

Goodman	£1,150 0 0
Thompson	1,049 0 0
Everard	989 0 0
Jennings (accepted)	975 0 0
Martin	899 0 0
Nicholls	798 0 0

LONDON.—For works at the Central Markets, for the Honourable the Corporation of London, under the superintendence of the City Architect, Mr. A. Peebles. Quantities by Mr. W. E. Stoner and Messrs. Franklin & Andrews:—

Cubitt & Co.	£18,867 0 0
Killby & Gayford	16,716 0 0
Clarke & Bracey	15,575 0 0
Ashby & Horner	15,567 0 0
Hall, Beddall, & Co.	15,554 0 0
W. Downs	15,527 0 0
Peto Bros.	15,467 0 0
Lawrance & Sons	15,421 0 0
J. T. Chappell	15,438 0 0
Holland & Hannen	15,396 0 0
J. Morter	15,220 0 0
M. Gentry	15,193 0 0
Mowlem & Co.	14,932 0 0
B. E. Nightingale	14,868 0 0
Perry & Co.	11,979 0 0

LONDON.—For works in alteration to lobby, &c., at the Guildhall for the Honourable the Corporation of London, under the superintendence of the City Architect, Mr. A. Peebles. Quantities by Mr. W. E. Stoner:—

Hall, Beddall, & Co.	£2,632 0 0
Lascelles & Co.	2,380 0 0
Perry & Co.	2,348 0 0
Clarke & Bracey	2,306 0 0
J. Morter	2,256 0 0
Colls & Sons	2,245 0 0
B. E. Nightingale	2,190 0 0
Mowlem & Co.	2,060 0 0
J. T. Chappell	2,035 0 0

LONDON.—For alterations at the "Washington" Music-hall, Battersea, for Messrs. G. W. Moore & Son. Mr. H. J. Newton, architect:—

Jackson & Todd	£1,667 0 0
Burman	1,645 0 0
Lamble	1,593 0 0
Beale	1,040 0 0

LONDON.—For heating the New Central Free Library, Lavender-hill, S.W., by low-pressure hot-water apparatus. Mr. E. W. Mountford, architect:—

J. Jones & Sons, 42, Farringdon-st., E.C. (accepted)	£134 0 0

LONDON.—For new grill-room and sundry works at "The Corn Exchange" Tavern, Mark-lane, E.C., for Mr. Charles Deakin. Messrs. Saville & Martin, architects, 86 and 87, Strand, W.C. Quantities supplied:—

Builder's Work.

S. Goodall	£1,440 0 0
W. Oldrey & Co.	1,398 0 0
Ward & Lamble	1,390 0 0
Gould & Brand (accepted)	1,327 0 0

Paviors's Work.

F. Russ	£172 11 6
Watts & Co.	106 13 6
W. Holling & Co.	154 15 0

Gasfitter.

E. Pragnell (accepted)	£45 11 6

LONDON.—For alterations and repairs to "The British Stores," 7, New-street, Portland-town, N.W., for Mr. S. Crimmon. Messrs. Saville & Martin, architects, 86 and 87, Strand, W.C. Quantities supplied:—

Builder's Work.

J. Birch	£373 10 0
J. Walker	298 0 0
J. Vears & Co.	284 0 0
Ward & Lamble	270 0 0
C. H. Bates (accepted)	247 0 0
Spencer & Co.	245 0 0

Pewterer's Work.

F. Ruse	£50 7 6
W. Helling & Co.	47 0 0
Watts & Co. (accepted)	44 14 0

Gasfitter.

E. Pragnell (accepted)	14 0 0

LONDON.—For alterations and repairs to "The Alfred" Tavern, Roman-road, Barnsbury, N., for Mr. Frank Silvester. Messrs. Saville & Martin, architects, 86 and 87, Strand, W.C.:—

Builder's Work, Pewterer's, &c.

J. Vears & Co.	£400 0 0
Spencer & Co.	350 0 0
J. Walker (accepted)	340 0 0

Gasfitter's.

J. Mann	£35 10 0
A. & F. Fernhead	28 5 0
E. Pragnell (accepted)	23 0 0

LONDON.—For alterations and repairs to "The Prince's Head," Buckingham-street, Strand, for Mr. F. Anstiss. Messrs. Saville & Martin, architects, 86 and 87, Strand, W.C.:—

J. Vears & Co. (accepted)	£230 10 0

LONDON.—For painting and general repairs to Nos. 93, 95, 97, 99, and 101, King's-cross-road, W.C., for Dr. Samuel Knaggs. Messrs. Saville & Martin, architects, 86 and 87, Strand, W.C.:—

Spencer & Co.	£640 0 0
Eddie	478 0 0
J. Walker (accepted)	425 0 0
Morris	424 0 0
Stone & Humphries	365 0 0

LONDON.—For painting and repairs to "The Old Cock Tavern," Highbury, N., for Mr. R. Baker. Messrs. Saville & Martin, architects, 86 and 87, Strand, W.C.:—

J. Vears & Co.	£248 0 0
G. H. & A. Bywaters	211 0 0
Spencer & Co. (accepted)	175 0 0

LONDON.—For the addition of a billiard-room to "Arkindale," Putney Hill, for Mr. C. J. Dickins. Mr. Ernest H. Abbott, architect, 6, Warwick-court, High Holborn, W.C.:—

Hall, Beddall, & Co.	£645 0 0
T. H. Adamson & Sons	595 0 0
C. Oldridge & Sons	585 0 0

PEMBROKE DOCK.—For heating the Wesley Chapel by low-pressure hot-water apparatus for the trustees:—

J. Jones & Sons, 42, Farringdon-st., E.C. (accepted)	£102 0 0

PENGE.—For the erection and completion of twenty-five cottages for the Tenants' Co-operative Society, Limited. Mr. G. Hubbard, architect. Quantities by Mr. J. Sergeant:—

	Twenty-five Cottages.	If one Cottage be omitted.*
Smith & Bulled, West Croydon	£4,625	£4,487

* Accepted.

SOUTH NORWOOD.—For alterations at Nos. 52 and 53, High-street, for Mr. C. Craddock. Mr. W. Lambert, architect:—

Smith & Sons, Norwood	£330 0 0
Smith & Bulled, Croydon	290 0 0
Bryan, Norwood	231 0 0

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